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KEY TO PRONUNCIATION.

ä	far, father
ā	fate, hate
a or ă	at, fat
ã	air, care
ạ	ado, sofa
â	all, fall
ch	choose, church
ē	eel, we
e or ĕ	bed, end
ė	her, over: also Fr. *e*, as in *de; eu*, as in *neuf;* and *oeu*, as in *boeuf, coeur;* Ger. *ö* (or *oe*), as in *ökonomie*.
ẹ	befall, elope
ẽ	agent, trident
ff	off, trough
g	gas, get
gw	anguish, guava
h	hat, hot
h or ʜ	Ger. *ch*, as in *nicht, wacht*
hw	what
ī	file, ice
i or ĭ	him, it
î	between e and i, mostly in Oriental final syllables, as, Ferid-ud-din
j	gem, genius
kw	quaint, quite
ṅ	Fr. nasal *m* or *n*, as in *embonpoint, Jean, temps*
ñ	Span. *ñ*, as in *cañon* (căn'yŏn), *piñon* (pēn'yōn)
ng	mingle, singing
nk	bank, ink
ō	no, open
o or ŏ	not, on
ô	corn, nor
ȯ	atom, symbol
ọ	book, look
oi	oil, soil; also Ger. *eu*, as in *beutel*
ō or oo	fool, rule
ou or ow	allow, bowsprit
s	satisfy, sauce
sh	show, sure
th	thick, thin
ŧh	father, thither
ū	mute, use
u or ŭ	but, us
ụ	pull, put
ü	between u and e, as in Fr. *sur*, Ger. *Müller*
v	of, very
y	(consonantal) yes, young
z	pleasant, rose
zh	azure, pleasure

′ (prime), ″ (secondary) accents, to indicate syllabic stress

MEXICO:

HISTORY AND MODERN DEVELOPMENT.

1. Mexico, United States of. *Geography.*—Mexico is situated between 14°, 30', 42" and 32°, 42" North lat., and between 86°, 46', 8" and 117°, 7', 31", 89 long. west of the meridian of Greenwich, and embraces 18°, 11', 18" of latitude and 30°, 21', 23", 89 of longitude. Its total area is 767,326 square miles, and its boundaries are the United States on the north, Guatemala and Belize on the southeast, the Pacific Ocean on the south and west, and the Gulf of Mexico and the Carribean Sea on the east. Its coast line on the east is 1,727 miles in length and on the west or Pacific side, 4,574 miles. The northern or United States boundary was fixed by treaty 2 Feb. 1848 and 30 Dec. 1853, and extends from the mouth of the Rio Grande, on the Gulf of Mexico, following that river a distance of 1,136 miles beyond El Paso, Texas; thence to a point on the Pacific Ocean, one marine league due south of the southernmost point on the Bay of San Diego. The total length of the northern boundary line is 1,833 miles.

The Guatemalan boundary line was fixed by treaty 27 Sept. 1883 and 1 April 1895; and the Belize line by treaty signed 8 July 1893, and ratified 19 April 1897. The length of the southern boundary of Mexico is 642 miles.

By the treaty of Guadalupe-Hidalgo (q.v.) ratified 2 Feb. 1848, and the Gadsden treaty of 30 Dec. 1853, Mexico ceded to the United States 930,590 square miles of her territory, or 163,264 more than half. The first named treaty involved 362,487 square miles of domain now part and parcel of the United States as follows: Texas, 265,780 square miles; Colorado (in part). 18,000; Kansas (in part), 7,766; New Mexico, 65,201; Oklahoma, 5,740. Under the terms of the second or Gadsden treaty the United States acquired 522,568 square miles, which are now held as follows: Arizona, 82,381; California, 157,801; Colorado (in part), 29,500; Nevada, 112,090; New Mexico, 42,000; Utah, 84,476; Wyoming (in part), 14,320. By virtue of the same treaty a later addition was ceded, consisting of 31,535 square miles to Arizona, and 14,000 to New Mexico, making a grand total of 930,590 square miles of territory, now constituting one of the richest and most productive portions of the possessions of the United States. See GADSDEN PURCHASE; ANNEXATION; UNITED STATES — ANNEXATION OF TEXAS; TERRITORIAL EXPANSION.

Population.—While the population of Mexico has not increased quite in proportion to that of the United States, because, principally, of the very small number of immigrants who have thus far entered her borders, notwithstanding the great productiveness of her soil, the salubrity of her climate, and the many other advantages held out by her, it has steadily advanced, having increased from about 5,000,000 in 1795 to about 6,000,000 in 1810; to about 6,500,000 in 1827; to 7,000,000 in 1839; to 7,853,395 in 1854; to 8,743,614 in 1869; to 9,384,195 in 1878; to 10,791,685 in 1886; to 12,570,195 in 1895; to 13,607,259 in 1900, and, according to an unofficial estimate, to about 14,000,000 in 1905. According to the government census of 1900, the population of the several states was as follows:

Aguascalientes	102,416
Campeche	86,542
Chiapas	360,799
Chihuahua	327,784
Coahuila	296,938
Colima	65,115
Durango	370,294
Guanajuato	1,061,724
Guerrero	479,205
Hidalgo	605,051
Jalisco	1,153,891
Mexico	934,463
Michoacan	935,808
Morelos	160,115
Nuevo Leon	327,937
Oaxaca	948,633
Puebla	1,021,133
Queretaro	232,389
San Luis Potosi	575,432
Sinaloa	296,701
Sonora	221,682
Tabasco	159,834
Tamaulipas	218,948
Tlaxcala	172,315
Veracruz	981,030
Zacatecas	462,190
Tepic	150,098
Lower California	47,624
Federal District	541,516
Yucatan	309,652

Of the total population of 13,607,259 in 1900 there were 6,752,118 males and 6,855,141 females. The percentage of whites, native Indians, and mixed races, may be put down as: Whites, 22 per cent.; native Indians, 31 per cent.; mixed races, 47 per cent. Of the total foreign population of 57,507 in the same year, 2,565 were Germans; 278, Arabs; 234, Austro-Hungarians; 140, Canadians; 2,721, Cubans; 2,834, Chinese; 16,258, Spaniards, 3,976, French; 3,325, Greeks; 5,804, Guatamalans; 2,845, English; 2,564, Italians; 15,265, North Americans; 391, Turks.

It is altogether probable that Mexico's total population at the close of 1906 was not less than 16,500,000 or 17,000,000. Because of the inaccessibility of large numbers of peons and Indians, the intense dislike of still larger numbers to have their names listed for any purpose of a public nature, and the neglect or inefficiency of many of the persons entrusted with the work of canvassing, no Mexican general census can be depended on as representing more than 80 to 85 per cent. of the entire population. In fact it is safe to assume that in no official statements relating to any department of Mexican statistical information are the figures equal to the facts.

In 1827 the British Minister to Mexico divided the population into these seven classes: (1.) Old Spaniards or Gachupines. (2.) Creoles or mixed whites of pure European race, born in America and regarded as natives. (3.) Indians or indigenous copper colored races. (4.) Mestizos or mixed whites and Indians gradually merging into Creoles. (5.) Mulattos or descendants of whites and negroes. (6.) Zambos or Chinos, descendants of negroes and Indians. (7.) African negroes, either manumitted or slaves. The first and last three classes he claimed to be pure and to have "given rise, in their various combinations," to the fourth class, which in turn was subdivided many times.

Territorial Divisions.— Mexico is divided into four territorial groups,— the central, the northern, the Gulf and the Pacific. The central comprises the states of Aguascalientes, Durango, Guanajuato, Hidalgo, Mexico, Morelos, Puebla, Queretaro, San Luis Potosi, Tlaxcala, Zacatecas and the Federal District, with a total surface of 143,777 square miles. The northern comprises the states of Chihuahua, Nuevo Leon, Coahuila and Sonora, with a total surface of 254,000 square miles. The Gulf group consists of the states of Campeche, Tabasco, Tamaulipas, Veracruz, Yucatan and the Territory of Quintana Roo, with a surface of 124,913 square miles. The Pacific group consists of the states of Colima, Chiapas, Guerrero, Jalisco, Michoacan, Oaxaca, Sinaola and the Territories of Tepic and Lower California, with 242,808 square miles of surface. To the total of these four groups must be added 1,560 square miles of surface, contributed by the 21 islands of Guadalupe, Cedros, Santa Margarita, Creciente, Revillagegido, Tres Marias, Tiburon, Angel de la Guarda, Montegue, San Esteban, San Lorenzo, San Jose, Cerralva, Santa Catalina, Monserrate, Carmen, San Marcos, Partida, Cozumel, Mujeres, Espiritu Santo, and a number of smaller ones not generally named in the official reports. The entire surface, including that of the islands, amounts to 767,059 square miles.

Topography.— In the length of coast line the peninsula of Lower California leads with 1,864 miles, Yucatan following with 615 miles, Sonora with 534, Sinaloa 317, Tepic and Jalisco 311, Veracruz 286, Guerrero 286, Oaxaca 255, Tamaulipas 249, Campeche 224, Chiapas 137, Tabasco 119, Colima 99, and Michoacan 81. The greatest length of the republic is from northwest to southeast, 1,942 miles; and the greatest width, east and west, is from the mouth of the Rio Grande to the mouth of the Rio Fuerte, 762 miles, and the narrowest is from the bar at Coatzacoalcos, on the Atlantic side, to San Francisco de mar, on the Pacific,— 134 miles.

The gulfs of Mexico, California and Tehuantepec are the principal ones on the Mexican coast, the first named being the largest in the world, and in the commercial development of this continent they have performed and will always perform a most important part. Some idea of their commercial importance may be derived from the fact that in 1903 there entered the gulf ports of the republic, 3,271 steamships and 2,632 sailing vessels, the total tonnage of which was 3,678,583 tons. Mexico's great mass is the lofty Rocky Mountain plateau, which fills it nearly from ocean to ocean, leaving but a narrow strip of coast. Entering from Guatemala (where a spur connects with the limestone and coral table-land of Yucatan), the system trends west, forming a table-land 150 miles wide at Oaxaca, with a steep descent and slender coast on the Pacific, but a more gradual one by terraces to the Gulf in Tabasco and Veracruz. This spreads and swells northward to the vast plateau of Anahuac, 4,000 to 8,000 feet high, where the oceanic relations are reversed, the Atlantic side precipitous and the Pacific terraced. There is no single range corresponding to the Andes or northern Rockies; the so-called *cordilleras* are merely the outer escarpments of the plateau, though often far above its mean level. Loftiest of these is the Sierra Madre of the Pacific, traceable at a mean elevation of over 10,000 feet from Oaxaca to the United States. It skirts the western coast within 60 or 70 miles to the entrance of the Gulf of California; thence onward a far wider coast land has silted up. Along the Gulf of Mexico are the correspondent cordilleras of Tamaulipas and Nuevo Leon, 6,000 feet in mean elevation; and the southern central plateau maintains its height of 7,000 to 8,000 feet with great persistency to within 40 miles or less of the Atlantic. Through Lower California is a similar ridge some 3,000 feet high. The plateau is no level surface; railroad elevation north from the capital vary by 4,500 feet, declining northward; and the centre is intersected by short secondary ridges and valleys, mostly with the north-northwest trend. Most important of these is the Anahuac Cordillera, surrounding the valleys of Mexico and Puebla; its culminating point is Toluca Nevado ("snow peak"), 15,163 feet. But across this, and generally confounded with it, is a newer transverse ridge from ocean to ocean, traced by five active or recently quiescent volcanoes and several extinct cones, among which are Popocatepetl in the centre, southeast of Mexico City, 17,882 feet; Orizaba, eastward bordering Veracruz state, 18,696 feet; and Ixtacihuatl, northeast of Popocatepetl, 17,338 feet. On the Pacific side is Colima volcano in Jalisco, 12,989 feet; and the line runs out to the Revillagigedo volcanic islands. The sierras of Guerrero, Oaxaca, and Chiapas are nearly parallel to this.

The mountains or peaks of the republic most noted for their great height are, in order of height: Orizaba, in the state of Veracruz, 18,696 feet; Popocatepetl, in the states of Mexico and Puebla, 17,882; Ixtaccihuatl, in the same states, 17,338; Nevado de Toluca, in the state of Mexico, 15,163; Malinche, in the states of Tlaxcala and Puebla, 14,643; Cofre de Perote, in the state of Veracruz, 14,042; Ajusco, in the southern part of the Valley of Mexico, 13,075; Colima, in the state of Jalisco, 12,989, Tancitaro, in the state of Michoacan, 12,661; Patamban, in the same state, 12,300; Derrumbadas, in the state of Puebla, 11,801; Ocelatzin, in the state of Puebla, 11,480; Cempoaltepetl, in the state of Oaxaca, 11,139; Lanitos, in the state of Guanajuato, 11,021; Tzirate, in the state of Michoacan, 11,022; Zumate, in the state of Hidalgo, 10,994; Quinceo, in the state of Michoacan, 10,903; Penal, in the state of Puebla, 10,744; Navajas in the state of Hidalgo, 10,289; Laurel, in the state of Aguascalientes, 10,138. Topographically, the mountains of Mexico are exceptionally picturesque and interesting, affording innumerable views which are beautiful in the extreme.

Rivers.— Mexico is not a country of many or large rivers, and a considerable proportion of those appearing on the maps are either wholly or practically dry a part of each year. This is especially true of the northern half of the republic. The more prominent rivers are the Bravo (Rio Grande), which is the northern boundary line of the republic for a distance of 1,097 miles;

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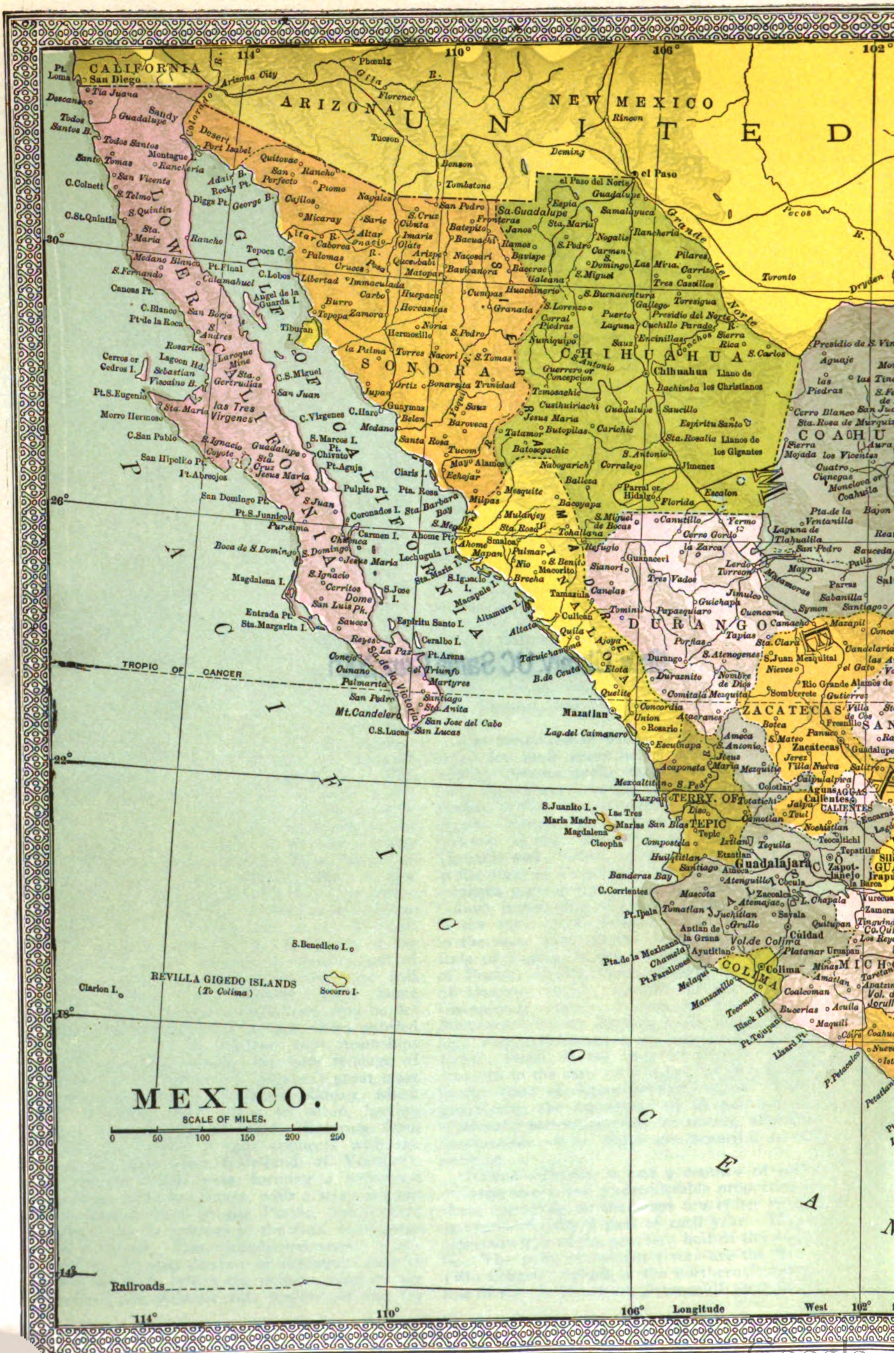
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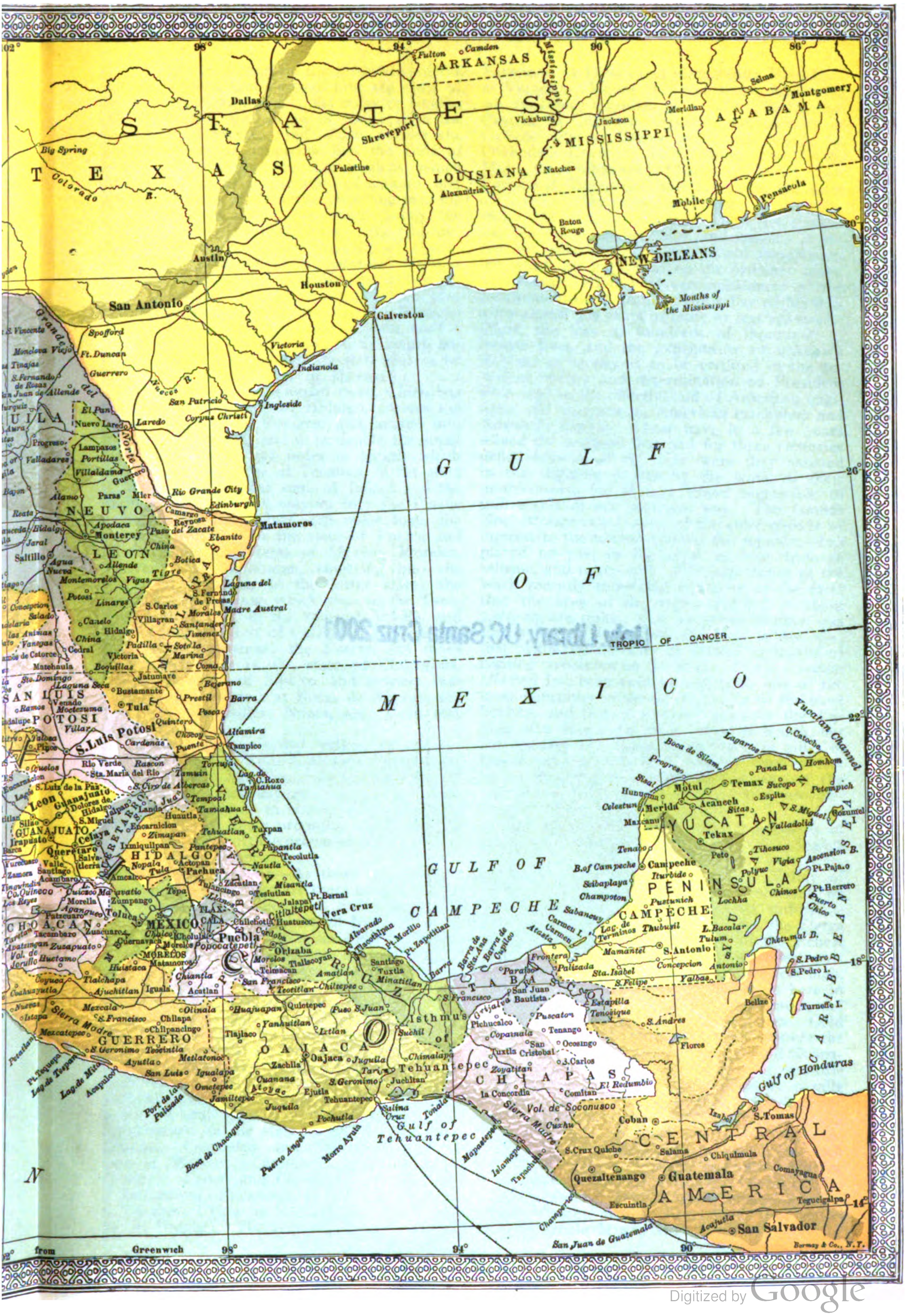
Mascota
Tomatlan
Juchitlan
Grullo
Sayula
Autlan de la Grana
Ayutitlan
Vol.de Colima
Colima
COLIMA
Ciudad
Platanar
Urupan
Zapotlanejo
la Barca
Quitupan
S.Juanito I.
Las Tres Marias
Maria Madre
Magdalena
Cleopha
Banderas Bay
C.Corrientes
Pt.Ipala
Pta.de la Mexicana
Chamela
Pt.Farallones
Melaque
Manzanillo
Tecoman
Black Hd.
Pt.Tejupan
Lizard Pt.
Coalcoman
Bucerias
Aculla
Maquili
Amatlan
MICH
P.Petacalco
Petatlan
S.Benedicto I.
REVILLA GIGEDO ISLANDS (To Colima)
Socorro I.
Clarion I.



102°
98°
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30°
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22°
18°
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STATES
TEXAS
ARKANSAS
LOUISIANA
MISSISSIPPI
ALABAMA
Mississippi
Colorado R.
Nueces R.
Rio Grande del Norte
Fulton
Camden
Dallas
Shreveport
Vicksburg
Jackson
Meridian
Selma
Montgomery
Big Spring
Palestine
Natchez
Alexandria
Mobile
Pensacola
Baton Rouge
NEW ORLEANS
Mouths of the Mississippi
Austin
Houston
Galveston
San Antonio
Spofford
Ft. Duncan
Guerrero
Victoria
Indianola
San Patricio
Ingleside
Corpus Christi
Laredo
Nuevo Laredo
El Paso
Lampazos
Progreso
Rio Grande City
Edinburgh
Camargo
Reynosa
Matamoros
Mier
Paso del Zacate
Ebanito
NEUVO LEON
Monterey
Apodaca
Allende
China
Montemorelos
Linares
Saltillo
Botica
Laguna del Madre
S. Fernando de Presas
Austral
TAMAULIPAS
S. Carlos
Villagran
Padilla
Victoria
Soto la Marina
Jimenez
Santander
Croma
Jaumave
Bustamante
Tula
Bejarano
Barra
Prestil
SAN LUIS POTOSI
S. Luis Potosi
Venado
Moctezuma
Villar
Cardenas
Quintero
Chocoy
Altamira
Tampico
Puente
Rio Verde
Rascon
Tamuin
Tortuga
Lag. de Tamiahua
C. Rojo
S. Ciro de Albercas
Tempoal
Tamiahua
Tuxpan
Papantla
Tecolutla
Nautla
Misantla
Jalapa
Cofre de Perote
Citlaltepetl
Pt. Bernal
Vera Cruz
Alvarado
Tlacotalpan
Pt. Morillo
Pt. Zapotitlan
VERA CRUZ
Orizaba
Cordoba
Huatusco
Puebla
Popocatepetl
Cholula
Tehuacan
Teotitlan
Chiltepec
Tuxtla
Santiago
Minatitlan
Barra
Isthmus of Tehuantepec
GUANAJUATO
Guanajuato
Leon
Celaya
Queretaro
QUERETARO
HIDALGO
Pachuca
Tula
Actopan
Zimapan
Tulancingo
Zacatlan
MEXICO
Toluca
MORELOS
Cuernavaca
Matamoros
MICHOACAN
GUERRERO
Chilpancingo
Sierra Madre
Tlalchapa
Iguala
Olinala
Acapulco
Ometepec
Jamiltepec
Juquila
OAJACA
Oajaca
Huajuapan
Yanhuitlan
Ixtlan
Tlaxiaco
Tehuantepec
Juchitan
Chimalapa
Salina Cruz
Pochutla
Port de la Palizada
Boca de Chacagua
Puerto Angel
Morro Ayuta
Gulf of Tehuantepec
Tonala
GULF OF MEXICO
TROPIC OF CANCER
GULF OF CAMPECHE
TABASCO
Frontera
Paraiso
San Juan Bautista
Grijalva
S. Francisco
Estapilla
Tenosique
CHIAPAS
Pichucalco
Copainala
Tuxtla
San Cristobal
Tenango
Ocosingo
S. Carlos
Zoyatitan
Comitan
La Concordia
El Redumbio
Vol. de Soconusco
Sierra Madre
Cuxhu
Mapastepec
Tapachula
Champerico
Islamapa
Carmen I.
Atasta
Lag. de Terminos
Palizada
Sabancuy
Champoton
CAMPECHE
Campeche
B. of Campeche
Seibaplaya
Mamantel
S. Antonio
Concepcion
Sta. Isabel
S. Felipe
Yalbac
YUCATAN PENINSULA
YUCATAN
Merida
Progreso
Sisal
Hunucma
Celestun
Maxcanu
Motul
Temax
Tekax
Peto
Tihosuco
Valladolid
Espita
Sucopo
Panaba
Lagartos
Boca de Silam
C. Catoche
Holbox
Yucatan Channel
Petempich
Cozumel
S. Miguel
Ascension B.
Pt. Pajaro
Pt. Herrero
Chinos
Puerto Chico
Vigia
L. Bacalar
Tulum
Chetumal B.
S. Pedro I.
Turneffe I.
Belize
CARIBBEAN SEA
Flores
S. Andres
Gulf of Honduras
Izabal
S. Tomas
CENTRAL AMERICA
Coban
Salama
Chiquimula
S. Cruz Quiche
Quezaltenango
Guatemala
Escuintla
Comayagua
Tegucigalpa
Acajutla
San Salvador
San Juan de Guatemala
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the Panuco, which rises in the mountains of the state of Mexico and empties into the Gulf of Mexico at Tampico and is 360 miles in length; the Papaloapan, the source of which is in the mountains of Oaxaca, and which crosses the state of Veracruz, emptying into the Gulf of Mexico at Alvarado; the Coatzcoalcos, which also has its source in the state of Oaxaca, and crosses the state of Veracruz, emptying into the Gulf at Coatzacoalcos, its length being 186 miles; the Grijalva, which rises in the Chuchumatenas mountains, in the republic of Guatemala, crosses the Mexican states of Chiapas and Tabasco, to the Gulf of Mexico, and is 327 miles in length; the Usumacinta, which also has its rise in Guatemala, crossing the Mexican state of Tabasco and emptying into the Gulf a short distance south of Frontera, its length being 450 miles. Official reports state this to be "the most navigable river in Mexico."

There are also the Tuxpan river, which has its source in the state of Hidalgo, crosses the states of Puebla and Veracruz and empties into the Gulf at Tuxpan, and is navigable for small boats; the Lerma, 457 miles in length which rises in the mountains of Tenango, in the state of Mexico, crosses the state of Jalisco and the territory of Tepic and empties into the Pacific at San Blas; the Balsas, 428 miles long, the source of which is in the state of Puebla and which crosses the states of Mexico, Morelos, Guerrero and Michoacan, emptying into the Pacific at Zacatula, in the latter state; the Yaqui, 391 miles long, which rises in the Tarahumari mountains, in the state of Sonora, and empties into the Gulf of California a short distance below Guaymas; the Fuerte, 335 miles long, which rises in the state of Chihuahua, crosses the state of Sinaloa and empties into the Gulf of California at Bocas de Ahome; the San Pedro, 298 miles; Nazas, 279; Ures, 260, and Sinaloa, 260.

Valleys.— The principal valleys of the republic are those of Toluca, Mexico, Cuernavaca, Puebla, Oaxaca, San Francisco and Orizaba, all of which are extremely rich in soil and most favorably situated as to climate and other conditions affecting their products, which include very nearly every article grown in other parts of the American continent.

Lakes and Lagoons.—As there are no large rivers in Mexico so also are there no large lakes. The principal ones, however, are Chapala, in the state of Jalisco, a beautiful body of water some 51 miles long and 18 miles wide, the shores of which have recently become a favorite summer resort for wealthy residents of Mexico City, Guadalajara and other parts of the republic. Next in extent, and even more beautiful, is Patzcuaro, in the state of Michoacan, around which there clusters a wealth of historic, artistic and poetic interest. Its shores and islands recall those of Lake George in the United States. The other lakes include Cuitzeo, in the same state, Xochimilco, in the Federal District, Texcuco, in the Federal District and state of Mexico; Tepancuapan, in the state of Chiapas; Tequesquitongo, Coatelelço and Hueyapan, in the state of Morelos; Catemaco, in the state of Veracruz; Caivel and Carpintero, in the state of Tamaulipas; Encantedo, in Tabasco; Bacular, in Yucatan; Uriria, in Guanajuato, and Meztitlan, in Hidalgo. The principal lagoons are the Terminos, in Jalisco and Michoacan; Tamiahua, in Veracruz; Madre in Tamaulipas; Mezcaltitlan, in Tepic; Coyutlan, in Colima; Tecpan and Coyuya, in Guerrero; Superior and Inferior in Oaxaca; Paras, Coyote and Agua Verde, in Coahuila; Guzman, Jaco, Patos, and Santa Maria in Chihuahua; Chalco, Xaltocan, San Christobal, Zumpango and Lerma in the state of Mexico; Meztitlan and Apan, in Hidalgo, and Santa Ana, in Tabasco. There are numerous other and smaller lakes and lagoons in the republic, which are of much local importance, but which do not appear on the ordinary maps.

Drainage.—The final accomplishment of the enormous task of draining the valley of Mexico, after almost 300 years of more or less spasmodic effort, the loss of hundreds of thousands of human lives, and the expenditure of unknown millions of money, is to be credited to the resistless energy and determination of President Diaz, and to the effective aid of American engineers and contractors; American machinery and American capital. These have in a few years solved the problem that had for three centuries defied human effort. Nor were they assisted in the slightest degree by the work of their predecessors, for it was found impossible to utilize this in any practical way. The famous Nochestonge canal,—one of the chief objects of interest to the tourist visiting the republic,—has played no part in the great modern drainage scheme, and never will. The importance of the work recently completed is shown in the facts that the area of the valley drained is about 2,200 square miles; that its entire surface was for cycles of time, covered by an inland sea; that originally the City of Mexico consisted of floating structures on the water; that the region affected has been transformed from one of the most unhealthy in the world to one of the most healthy, and that it involved not only the digging of a deep canal many miles in length, but the blasting of a tunnel more than six miles in length, and with a span ranging from 5 feet to 14 feet, through which the sewage of the capital and the drainage of the valley are discharged into the Pacific.

Geology and Minerals.— The foundations of the plateau and the prevailing ones of the higher ranges are granites, overlaid with basalt, trap, porphyry, and recent lavas; in the Valley of Mexico, interspersed with and overlaid by shales, greenstones, silicious schists, unfossiliferous limestone, etc. For 1,600 miles the Sierra Madre of the Pacific forms one of the richest mining districts of the world; its finest part being the western slope, 3,000 to 8,005 feet high. Almost every valuable metal known is here in profusion. Silver was mined by the Aztecs, and has been an important product ever since. Gold is found largely with it, also with copper; the latter exists nearly pure in Chiapas and Guanajuato. There are enormous masses of meteoric iron ore; Cerro de Mercado mountain a mile from Durango, is a solid mass of magnetite. Besides these are lead, antimony, mercury (in cinnabar), zinc, tin, platinum, bismuth, etc., besides sulphur pumice, asphalt, petroleum, rock salt, alum, marble, gypsum, and other articles, with famous mineral springs. There is also great wealth in gems,—opals, emeralds, amethysts, topazes, agates, garnets, etc. For statistics see article MINES AND MINING.

Altitudes.— The altitudes of 21 of the more prominent cities of Mexico are as follows:

City.	State.	Altit'de, Feet.
Aguascalientes	Aguascalientes	6,106
Chihuahua	Chihuahua	4,973
Cuernavaca	Morelos	5,060
Corduba	Veracruz	2,793
Guadalajara	Jalisco	5,171
Guanajuato	Guanajuato	6,834
Jalapa	Veracruz	4,689
Merida	Yucatan	26
Mexico City	Federal District	7,459
Morelia	Michoacan	6,314
Monterey	Nuevo Leon	1,624
Oaxaca	Oaxaca	5,072
Orizaba	Veracruz	4,090
Pachuca	Hidalgo	8,028
Patzcuaro	Michoacan	7,126
Puebla	Puebla	7,093
Queretaro	Queretaro	6,024
San Luis Potosi	San Luis Potosi	6,166
Silao	Guanajuato	5,828
Toluca	Mexico	8,760
Veracruz	Veracruz	26
Zacatecas	Zacatecas	8,189

Climate.— The chief natural glory of Mexico is its climate, which, though not as invigorating as that of some other countries, is one of the most delightful in the world. In few localities is there ever intense cold or intolerable heat. It is seldom that death results from freezing, and sunstroke is practically unknown. In the tropics, or hot country, the temperature varies from 77° to 82° Fahr., in the shade, while on the central plateau, which includes the capital city, it is much cooler in summer and warmer in winter than in the United States. In Mexico City the maximum summer temperature in the shade is 85°, and winter temperature 72°; in Puebla, 84° and 75°; in Oaxaca 94° and 83°; in Jalapa 89° and 87°; in Queretaro 90° and 80°; in Guanajuato 91° and 82°; in Pachuca 80° and 77°; in Saltillo 89° and 76°; in Merida 103° and 92°; in Mazatlan 91° and 84°. The official records show the average temperature in Mexico City for five months in 1905 to have been as follows:

	8 A. M.	Noon.	5 P. M.
June	59.6	69.7	69.3
July	59	69.6	69.5
August	57.5	69	68.8
September	56.6	67	66.8
October	55.5	67.3	67

The average night temperature was 55°. The warmest months of the year, in that city, are April and May,— the last two months preceding the beginning of the rainy season, which there extends from June to November. In the regions near the gulfs and the Pacific ocean, the rains are much heavier and more frequent, and begin earlier and end later. The average rainfall on the coasts is 44 inches and on the table lands 24 inches. In Mexico there are really but two seasons,— the rainy, or summer, and the dry, or winter. The temperature of the spring and autumn months differs very slightly, and the seasons merge into each other quite imperceptibly. The nights are always cool, except in the hot country, where they are seldom uncomfortable, the gulf and Pacific breezes compensating for the heat of the day. There are no radical or sudden changes of temperature; no prolonged term of heat or cold or storm; and on the table lands all seasons are so nearly alike that most persons wear clothing of the same, or practically the same weight all the year. Except in the northern states artificial heat is seldom provided, either in homes or places of business, even in mid-winter.

In few other countries is to be found such diversity of climate as in Mexico, where the Tropic of Cancer extends across 18 parallels of latitude, and where the altitudes range all the way from 26 feet above the sea at Veracruz, to 8,760 at Toluca, each plateau or step in the ascent illustrating in its fruits and foliage and flowers the marvelous influence of every climatic phase and condition. The white peaks of Orizaba, Popocatepetl and Ixtaccihuatl, which are snow-capped from January to January, look down upon a broad panorama of indescribable beauty to be seen only in this land of perpetual spring. Only in the states of Chihuahua, Durango, Zacatecas, Mexico, and possibly one or two others, and on the uninhabitable mountain heights do frosts ever occur. The summer rains on the upper plateaus simply intensify the green of the verdure, increase the number and beauty of the flowers, develope the fruits, sweeten the atmosphere, and drive away disease. Here the sun's rays are perpendicular, and in the middle of the day are very intense. In the shade, however, it is never uncomfortable.

Flora.— The physical conformation of Mexico is most favorable to the development of a wonderfully rich and varied economic flora. In the hot lands or coast regions, from the sea level to an altitude of 1,500 or 2,000 feet, cocoanuts, cacao, vanilla, peppers, nutmegs, ginger, cloves and other spices and all the fruits of tropical countries are successfully and profitably grown; while sugar cane, coffee, rice, cotton, tobacco, hemp, oranges, lemons, limes, bananas, mangoes, apples, peaches, papayas, pears, plums figs, cherries, grapes, zapotes, pineapples, mameys, pomegranates, yams, sweet potatoes, Irish potatoes, most of the edible roots, and, in fact about all the varieties of fruits and vegetables grown anywhere are found and successfully cultivated in altitudes up to and including the Valley of Mexico, 7,000 feet above the sea. The same is true of wheat, corn and most of the grains of commerce, the greater proportion of which reward the husbandman with liberal crops of excellent quality, frequently, in some of the states, twice or three times in a year,—notably in Veracruz, Tabasco, Chiapas, Oaxaca, Guerrero, Michoacan, Jalisco, Mexico and possibly one or two others. In Mexico there is no legitimate excuse for neglectful or indifferent cultivation of the soil, as the laborer may, if he will, comfortably employ his time in the fields every working hour of every day in the year. Here there is a favorable climate and suitable soil for every known grain, fruit, vegetable or plant. That these conditions have been utilized, even though in a more or less imperfect manner, is evidenced by the statement of a recognized authority, that 52 species of cereals and vegetables, 87 of fruits, 100 of odoriferous flowers, 56 of building woods, 21 of cabinet woods, eight of gums, three of resins, 12 of forages and 113 of medicinal plants here thrive and reach a high degree of perfection.

Flowers of almost innumerable varieties, from the gorgeous orchid of quaint and curious form and wonderful combination of colors, to the modest daisy, violet and tuberose, grow wild and in extravagant profusion all the year round, the range of altitudes meeting the requirements of all the members of the floral kingdom. The flower markets of Mexico City, which are chiefly supplied from the Chinampas or historic "floating gardens" established by the Aztecs on the surface of lake Tuxcoco before the coming of the Spaniards, are among the objects of interest most enjoyed by the visiting tourist, and eloquently testify to the beauty and brilliancy of the Mexican flora. This country has been deservedly named "the land of flowers," for everywhere and all the year there are flowers of every hue and color.

In the forests of the republic, especially in the tropical states, are found many varieties of trees the timber of which possesses great value for building or cabinet purposes. These include pine of several varieties, balsam, lignum vitæ, red cedar, mahogany, oak, rosewood, mezquite, olive, palm, almond, fir, sesame, cedar, camphor, turpentine pine, india rubber, copal, cacao, 12 species of dye woods and 17 varieties of oil-bearing trees. The arboreal vegetation of the country embraces 114 different species of woods.

Fauna. — Included in the fauna of Mexico are the American lion or puma, jaguar, ocelot, wildcat, wolf, coyote, bear, wild boar, bison, sloth, monkey, hare, rabbit, squirrel, armadillo, deer, beaver, otter, mole, marten, leopard, turtle, which are principally found in the sparsely settled mountains and in the forests of the tierra caliente. None of these are much hunted, the Indians of the country having little or no taste for this kind of sport.

In the tropics there are many varieties of rich plumaged birds, and song birds are found in all altitudes. Parrots and paraquites abound in the coast regions and are highly prized for their talking qualities and brilliant colors of green, yellow and red. Among the many species of song birds may be mentioned the zenzontla or mocking bird, the clarin and the nightingale. The birds of prey include the eagle, hawk, turkey buzzard and owl. Then there are the cotorra, the talking loro, the humming bird, sparrow, blackbird, turtle dove, woodpecker, swallow, magpie, heron, falcon, kite and great numbers of others, which inhabit the forests or fields where there is abundance of insect and other food for their sustenance. To give the names of these would require much space. In all localities where there are fresh water lakes, lagoons, ponds or rivers there are great numbers of wild ducks and many geese, and in the forests the wild turkey abounds. Wild bees are numerous, and the Indians derive quite an income by securing their honey and marketing it in the cities and towns. Of domestic or barnyard fowls the number and variety are very extensive, and their consumption by the people of the country is enormous. Until the Spaniards came all such fowl were unknown.

The waters of the Mexican gulfs, lakes, and rivers are well stocked with many varieties of fish of excellent quality, the most prized being the red snapper. The markets of Veracruz, Tampico and other coast cities daily display a tempting supply and variety from the gulfs, the Pacific and the accessible rivers, and large quantities are shipped to inland points by railway, in refrigerator cars. In the immediate vicinity of Tampico many tarpon of large size are caught.

Of reptiles there are many varieties, both venomous and harmless, especially in the southern forests. In the first named class are included boas, corals, and rattlesnakes. Then there are many varieties of scorpions, tarrantulas and lizards, some of the latter being so large as to be utilized by the natives as an article of food, and at least in size, but not the least dreaded, is the mosquito.

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2. Mexico—Archæology. One of the many crimes committed by the conquerors of Mexico in the early period of their success was the wanton destruction of a great part of the Aztec hieroglyphs (picture writings), monuments, and temples which constituted the only recorded or connected history of the country, its laws, its people, and their customs and habits, their achievements, learning, ambitions, and superstitions,— a civilization antedating almost all others of which the world has any exact knowledge. And the greater was the shame because perpetrated in the name of Christianity. But, fortunately, enough was left and is being carefully preserved on which to build a wonderfully interesting and instructive superstructure of fact and conjecture that can, with reasonable confidence, be accepted as true.

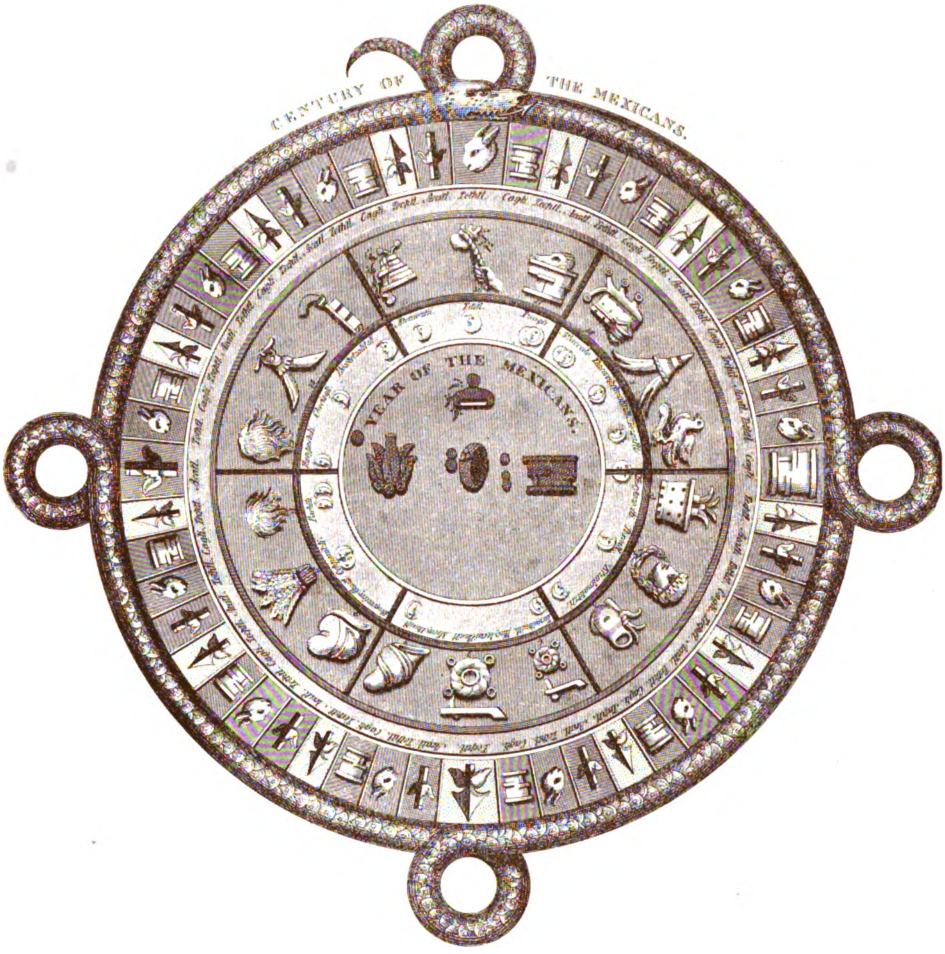
Since 1773 there has been shown constant and most praiseworthy desire by the government of the country and the various historical and scientific organizations to strengthen this necessarily incomplete record. The work of exploration has been prosecuted more or less systematically and earnestly for many years, and discoveries of the greatest importance have, from time to time, added priceless treasures to the rapidly filling storehouse. To Emperors Iturbide and Maximilian seems to be due the credit for having taken the only practically effective steps following those of Viceroy Don Antonio Maria de Bucareli y Ursua, in 1775, looking to the preservation of these treasures, among which the more notable are the great Calendar Stone; the Sacrificial Stone; the head, in stone, of Totec and that of Huitzilopochtli in clay; the statues, in stone, of Quetzalcoatl (God of Air); the Goddess of Water, (the Fainting Stone); Coatlicue; the Toltec Atlantis; Chac-Mol, (the Tiger King); Mixcoatl, (God of Fire and of the Chase); Izcozauhqui, (Sun God); El Indio Triste, (the Sad Indian); a number of stone vases for receiving the blood of sacrifices; Tzontemoc (Vase of the Sun), used for receiving human hearts; the Goddess of Death; the Rock of the Famine; the God of Agriculture; Cihuacoatl, (the Woman Serpent); the Goddess of Music; numerous crosses and symbols in stone; Tlaloc, (the God of Rain); a collection of Aztec funeral urns; Mictlanteuhtli, (the God of Death); the Yoke of the Sacrifice; examples of Aztec pottery and terra cotta idols; Zapotecan and Tarascan pottery; idols and jewelry of gold, and an extensive collection of musical instruments and Indian paintings.

That great numbers of other treasures than have been assembled here still lie buried under the paved streets and ancient edifices of the capital and in innumerable places in other parts of the republic, awaiting discovery, is not doubted. Several very important objects were unearthed quite recently by workmen employed in excavating in connection with the city's drainage system. Some of these are of enormous size and were elevated to the street surface with much difficulty. There is an official commission for archæological investigation, and without doubt the government will devote earnest and unremitting effort toward further and systematic explorations, as soon as it can find time from the exacting demands of the present unparalleled period of industrial development. What with the ruins of the Casas Grande, in northwestern Chihuahua; of Chichimec, near Durango; of La Quemada, southwest from Zacatecas; of Teul and Juchipela, in the extreme southern part of the same state; of Mitla, in the state of Oaxaca; of the Sepulchres of Xoxo; the Fortifications of the Peñon de Mitla and Monte-Alban; the relics of Temples, Palaces, and Tombs of Chichen Itza and Uxmal, in Yucatan; the Palaces at Palenque, in Chiapas; the Temples on the Usumacinta river, and the ruins, pyramids, tombs, idols, ancient pottery, etc., of Tlaxcala, Puebla, Veracruz, Morelos, Guerrero, and Hidalgo, there is in Mexico a most inviting field for the archæologist and ethnologist. In fact, there are many sections of the country which have not yet been even cursorily examined, much less systematically explored. In Yucatan, Oaxaca, and Campeche there are well-organized archæological museums, and others will be established in other state capitals as the work of exploration progresses. By some writers it is claimed that Uxmal, near which the City of Merida, in Yucatan, is situated, and the ruins of which are among the most ancient and interesting in Mexico, was built by the Mayas and was the cradle of the world's civilization. Although not so ancient as Uxmal, the ruins of Palenque, in the state of Chiapas, the Pyramid of Cholula, near the city of Puebla, the two great pyramids of Teotihuacan, 25 miles northeast from the City of Mexico, and the Palaces of Mitla, 25 miles southeast from the city of Oaxaca, all antedate by a long period of time, the coming of Cortes.

So closely connected with the archæology of a country is its ethnology, that it seems most appropriate to introduce in this article some statistics regarding the interesting and unusual mixture of races, languages, temperaments, tastes, and other characteristics of the people who populated Mexico. From the icebound regions of the far north, from the extremes of Alaskan winters and the torrid summers of the far south, they came,— Iberians, Semites, Hamites, Goths, Romans, Celts, and Vandals,— to this compromise ground,— this country where there are no extremes and where existence is not dependent upon artificial protection or stimulant. It has been asserted by a noted authority that in the composite population of this country “is mingled the blood of more races than in that of any other nation on earth.” According to the Curator of the Division of Ethnology of the United States National Museum the linguistic families of Mexico consist of 14 divisions, the census of which, in 1895, was as follows: Nahuatlan, 1,750,000; Piman, 85,000; Yuman, 2,500; Serian, 200; Tarascan, 250,000; Zoquean, 60,000; Totonacan, 90,000; Zapotecan, 580,000; Otomian, 704,734; Otomian (not certain), 5,000; Mayan, 400,000; Tequistlatecan, 31,000; Huevan, 3,800; Athapascan, 8,000; total, 3,970,234. These linguistic families are distributed as follows: Nahuatlan, or Mexican, in the states of Aguascalientes, Colima, Guerrero, Hidalgo, Jalisco, Mexico, Michoacan, Morelos, Oaxaca, Puebla, Sinaloa, Tabasco, Tlaxcala, Veracruz, and in the Federal District; Piman, in the states of Chihuahua, Durango, Coahuila, Sinaloa, Sonora, and Zacatecas; Yuman, in the northern part of the territory of Lower California; Serian, in the state of Sonora and on the Tiburon Island; Tarascan, principally in the state of Michoacan, with a few in Guerrero and Jalisco; Zoquean, chiefly in Oaxaca, and a less number in Guerrero and Puebla; Totonacan, in the northern part of the states of Puebla and Veracruz; Zapotecan, chiefly in the state of Oaxaca and a small number in Guerrero and Puebla; Mayan, in the states of Yucatan, Chiapas, and Veracruz; Tequistlatecan, in the state of Oaxaca; Huevan, in the state of Chiapas; Otomian in the states of Guanajuato, Hidalgo, Queretaro, San Luis Potosi and Michoacan; Athapascan, in the states of Chihuahua and Sonora. The last-mentioned family is composed of intruders from the United States and includes the troublesome Yaqui tribe.

Mexico, which may be termed the Egypt of the American continent or New World, holds within her borders innumerable sculptures which bear striking resemblance to those of the Egypt of Pharaoh. On the walls of ancient temples and palaces, on statues of her gods, on idols large and small, and on many other objects which have been decorated by the hands of her ancient artisans, there is to be seen unmistakable evidence of Egyptian origin. The age of the civilization which pro-

MEXICO.


CENTURY OF THE MEXICANS.
YEAR OF THE MEXICANS.

One of the peculiar devices by which the ancient Mexicans computed time.

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duced the archæology of this country in which centuries are considered as if only years, and which possesses such wealth of interesting antiquities, is necessarily more or less a question of conjecture, and must always so remain. So great is the diversity of opinion on this subject, among writers and authorities, both ancient and modern, that its study becomes more and more confusing with each step of its progress. Alfredo Chavero, the able Curator of the National Museum of Mexico, to whom belongs the honor of having suggested the «American Archæological and Ethnological Commission» created in Washington in 1902, and who is unquestionably the greatest Mexican authority regarding the archæology and ethnology of the country, dates the origin of Toltec civilization, from 3,000 to 4,000 years before Christ. Not less confusing are the various theories as to the number and variety of indigenous tongues spoken, or as to the sources from which came these incongruous races; one writer placing the number of theories regarding the latter, at 16. Of two presumed authorities, one gives the number of tongues as 108, and the other as 150. Regarding the origin of these tongues, there is equal diversity of opinion; the range of location including Egypt, China, Asia, the Island of Atlantis, and Africa. Humboldt believed that Mexican civilization was borrowed from Asia; Hernandez and Acosta, that the country was peopled from the Old World, in antedeluvian times; Siguenza, that the Mexicans were the direct descendants of Naphtuhim, son of Mizraim and grandson of Noah, who, according to tradition, migrated from Egypt to Mexico following the confusion of tongues; Lord Kingsborough devoted a fortune in a persistent effort to prove that the original Mexicans were recruited from the lost tribes of Israel; and another great student of ancient history asserted that «the original peopling of America may well date from the time when there was continuous land between it and Asia.»

When recently some workmen were excavating in the courtyard of the National Palace of Justice, they unearthed one of the most remarkable and important statues yet discovered, — a crouching ocelot or native tiger, — which Mrs. Nuttall, a noted archæologist, describes as «the finest piece of animal sculpture that has as yet been found on the American continent,» and which she asserts «must have been considered an image of the god Tezcatlipoca.» The carving on this statue, which includes two seated human figures surmounted by feather head dresses, appears to have been done in the year 1480.

The greatest of the pyramids of Teotihuacan is that of Tonatiuh (the Sun), which is larger at the base than any of the pyramids of Egypt, though not quite as high as the highest of these. It is 761 feet square at the base, 216 feet high, and has three separate terraces. Its summit is 75 feet square. It has been found that at different periods successive kings or rulers added greatly to the size of this pyramid, while carefully preserving its proportions. The last of these additions, the surface of which had been made rough and somewhat irregular by time and the elements, is now being removed by the government, at an estimated expense of $1,000,000, exposing to view the smooth, hard surface of the one last preceding. It is related that Cortes supposed this and its companion pyramids to be natural hills or mounds, so great was their size. As further evidence of the enormous proportions of many of the more notable examples of Mexican archæological antiquities, it may be stated that the great calendar stone is 11 feet, 8 inches in diameter, weighs 53,792 pounds, and required the combined strength of 5,000 men to remove it from Coyoacan, where it was carved, and that the famous Sacrificial Stone, which was discovered in 1791 near the Cathedral of Mexico City, is eight feet in diameter, and almost three feet high. The statue of the Goddess of Water is 10 feet, 5½ inches in height, and 5 feet, 5 inches wide at the base, and weighs 18 tons; the statue of Coatlicue is eight feet high and five feet in diameter, and the colossal head of Totec is three feet high, over two feet wide, and about seven feet in circumference. Most of the pyramids, fortifications, and temples, from the ruins of the Casas Grande in the border state of Chihuahua, on the north, to the Palaces of Chichen Itza in Yucatan, on the south, convey to the mind a sensation of profound awe by their great size and the evidences of magnificence, artistic taste and symmetrical beauty shown in their planning and construction. For example, there are two cap stones at Mitla, on a wall 20 feet high, each of which is 19 feet 6 inches long, five feet wide, and four feet thick, and estimated to weigh 67,000 pounds.

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W. W. Blake,
Author of 'The Aztec Calendar,' etc.

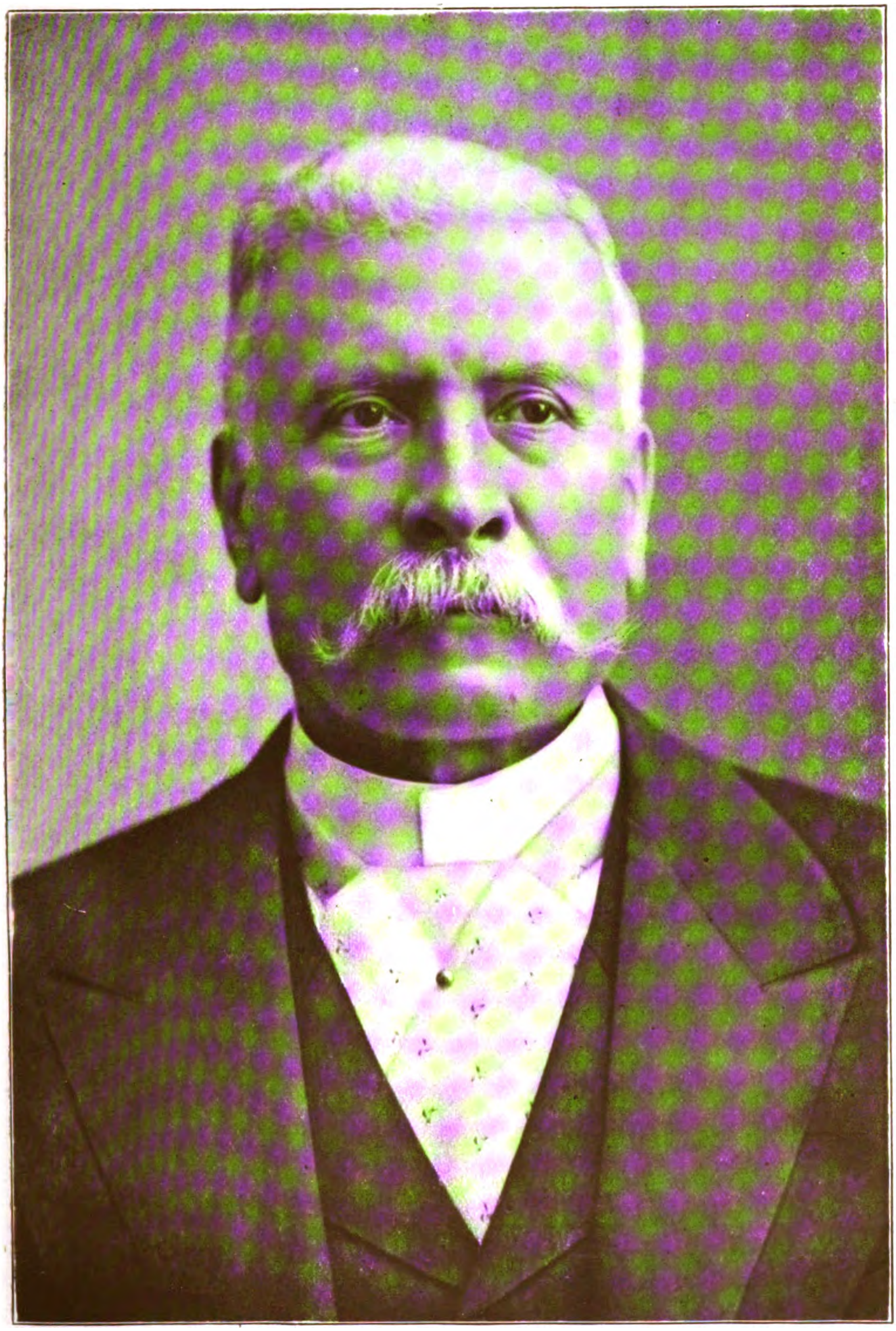
3. **Mexico—History.** The true history of Mexico, unsullied by prejudice, wholly free from misinformation and complete in the presentation of details, in conclusions reached, and in both praise and criticism, is yet to be written. In order to collect the materials for and prepare such a history, its author must devote years of residence in the republic; must personally visit and exhaustively study every state and territory within its boundaries; must thoroughly investigate its ruins and other long-buried evidences of a civilization regarding which too little is known; must exhaust the long-neglected, musty tomes of public and private libraries; must know how to sift the wheat from the chaff; must be able to distinguish truth from fiction, the reasonable from the unreasonable, and must attune himself to the customs, traditions and sentiments of the people of whom and of whose fair land he would write. It is not sufficient to read existing histories, interview a few wise men, visit the National Museum, stroll through the National Library, and study the natural characteristics of the country and its people, from the windows of a fast moving railway train. Of materials for a history that shall neither prove misleading nor inspire prejudice there is ample store within easy reach of the mind able and disposed to make right use of it

But the proper accomplishment of the task will involve the production of many volumes and the undoing of much that has been done in the past, which had not been well considered or fully proven.

The history of Mexico dates back to about the year 660 A. D., according to generally accepted tradition; but from that period until 1196, there is not known to have existed any record of the conditions or events which filled the intervening time,—530 years of Toltec and other civilizations that may have exceeded in wisdom and splendor all that followed. It has been asserted that back of all recorded history, and contemporaneous with the antediluvian fauna or with the prehistoric man of the old world, was the first appearance of his counterpart on this continent. But we have principally to consider here the more important incidents in the recorded history of this wonderful country; its growth and development; its alternating periods of good and evil import; its part in the affairs of the family of nations, and the circumstances in its national life which relate more directly to its past, present, and future career as a nation.

Name and Early History.—Mexico derived its name from that of a group of American Indian tribes known as Mexica or Azteca, which entered the valley now teeming with a prosperous population of almost a million souls, in the 12th century; later, or about the year 1325, laying the foundations of the present capital. They had penetrated the country as far as Tula, 50 miles north of Mexico City, as early as 1160, where they remained almost 130 years, or until 1325, when the advance southward was renewed, terminating permanently on the shores of Lake Tuxcoco, in the heart of the mountain enclosed valley. But the Aztecs were not the first to arrive, having been preceded by the Toltecs, who came from the far north, according to tradition, in the 8th century; some writers placing the time as early even as the 6th century. What is known as the Aztec period was really not inaugurated until about 1430, and the name Mexico was not formally given the country until after the arrival of the Spaniards, by whom it was coined from the sources named above. Between the 8th century and the founding of the city in 1325, wars, famine, pestilence, human sacrifices, jealousies, conflicting ambitions, and other afflictions which must have greatly reduced the population and retarded all manner of progress, seem to have followed each other in rapid succession. In the 145 years ending with the coming of the Spaniards in 1521, 10 successive kings ruled the Aztecs; and between 1521 and 1821, in which latter year the Spanish yoke was thrown off, the country was ruled, in turn, as New Spain, by five governors, two royal commissioners, and 61 viceroys.

Mexico became part and parcel of the already existing group of American territories in 1540, adopting the name New Spain, and at once passing under the domination of viceroyalty represented, in a little less than 300 years, by some 60 viceroys, whose chief purpose seems to have been the robbery of the mines and of the people for the benefit of themselves and the Spanish government. Not until 1808 did Mexico awake to a full realization of the debasing and humiliating conditions that had been bequeathed by Spain and most cruelly enforced and perpetuated by her conquerors, through almost three centuries of intrigue and oppression, panoramic changes of government, and successive revolutions that effectually stifled all hope or possibility of material or intellectual advancement. From 1810, in which year the patriot Hidalgo (q. v.) took up arms in a determined and desperate resolve to rid the country of Spanish oppression, to 1821, when success was finally achieved, not even the terrors of the Inquisition, nor the fear of violent death, was sufficient to turn back or even seriously check the tide of patriotic effort. During this period, both Hidalgo and Morelos (q. v.), who were successively the greatest leaders of the revolt against Spanish rule, were executed, and many thousands of their faithful followers sacrificed their lives to the great cause. Between 1821, in which year the independence of Mexico was formally acknowledged by Spain, and 1884, when Porfirio Diaz (q. v.) became President a second time, succeeding Manuel Gonzales (q. v.), who had himself succeeded Diaz, 67 years of alternating revolutions, conflicting policies, disorder, political scheming, conflict of arms, uncertainty, and financial discredit at home and abroad, had passed,—a brief period, as time is computed in the making of history,—yet long enough to include, in its rapid procession of events, the establishment and brief existence of a regency and an emperorship by Iturbide (q. v.); the proclaiming of a republic by Santa Anna (q. v.), followed by a provisional government; the abdication and flight to England of Iturbide; the return of Iturbide and his execution; the adoption of the first liberal constitution and the election of Don Felix-Victoria, as the first President under its provisions; the contested presidencies of Pedrazo, Guerrero, and Bustamante; the reaction of the Church party; the abolition of the constitution of 1824; the fusion of Confederate States, with Santa Anna as President or Dictator; the cession of Texas and capture of Santa Anna; the return of Santa Anna and his resumption of the presidency; the election of Bravo (q. v.) as President; the Dictatorship of Santa Anna; the restoration of the constitution of 1824; the second re-election of Santa Anna to the presidency and his subsequent banishment from the country; the successive presidencies of Canaliza and Herrera; the war with the United States to recover Texas; the ceding of two-fifths of Mexico's possessions to the United States; the second Dictatorship of Santa Anna: the ceding of more territory to the United States; the flight of Santa Anna; a period of provisional government under Comonfort (q. v.) as President; the rupture with Spain; the adoption of another constitution and its subsequent suspension; the Dictatorship of Comonfort; the inauguration and success of the War of Reform; the deposition of Comonfort by Zuloaga; the abdication of Zuloaga (q. v.) in favor of Miramon (q. v.); the supplanting of Miramon by Zuloaga; the recognition of the Juarez government by the United States; the capitulation of Guadalajara to Juarez; the flight of Miramon; the success of the liberal government; the triumphal entry of Juarez (q. v.) into Mexico City: the confiscation of $375,000,000 worth of church property and fully one-third of the land of the country by the Juarez government; the final separation of Church and State; the occu-



GENERAL PORFIRIO DIAZ.

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pation of Veracruz by Spain, France, and England as a means of enforcing payment of losses incurred by certain of their subjects; settlement of the claims of Spain and England; the occupation of Mexico City by the army of France; the acceptance of the crown by Archduke Maximilian (q. v.); the withdrawal of the French and the abandonment of Maximilian by Napoleon; the execution of Maximilian at Queretaro; the election of Juarez to the presidency, and his subsequent death; the presidency of Tejada; the amending of the constitution; the first election of President Diaz; the election of Gonzalez, and the second election of Diaz, who has held the high office through successive elections ever since. Truly, a remarkable series of momentous events to have occurred in so brief a period of time. In order that the reader may fully understand and appreciate the political condition existing in Mexico during the period covered by the successive Regencies, Empires, Dictatorships, and Republics through which she has passed, it is important to consider the transient and uncertain tenure of their duration, which is shown in the following table:

REGENCIES.

Years. Names.
1821-1822 — First, Don Augustin de Iturbide, Don Juan O Donoju, Don Manuel de la Barcena, Don Isidro Yañez, and Don Manuel Velasquez de Leon; Second, Don Augustin de Iturbide, Don Isidro Yañez, Don Miguel Valentin, Count de Casa de Heras, and Brigadier General Don Nicolas Bravo.
1822-1823 — Don Augustin de Iturbide, with title of Augustin I.

PROVISIONAL GOVERNMENT.

1823-1824 — A council with supreme executive power, composed of Don Nicolas Bravo, Don Guadeloupe Victoria, and Don Pedro Negrete, with Don Jose Maria Michelena, and Don Miguel Dominguez as substitutes.

FEDERAL REPUBLIC.

Presidents.

1824-1829 — Gen. Guadeloupe Victoria.
1829 — Gen. Vicente Guerrero.
1829 — Don Jose Maria Bocanegra.
1829 — Don Pedro Velez.
1829 — Gen. Luis Quintanar.
1829 — Don Lucas Alaman.
1830-1832 — Gen. Anastacio Bustamante.
1832 — Gen. Melchor Musquiz.
1832-1833 — Gen. Manuel Gomex Farias.
1833 — Don Valentin Gomez Farias.
1833 — Gen. Antonio Lopez de Santa Anna.
1833-1834 — Don Valentin Gomez Farias.
1834-1835 — Gen. Antonio Lopez de Santa Anna.
1835-1836 — Gen. Miguel Barragan.
1836-1837 — Don Jose Justo Corro.

CENTRAL REPUBLIC.

1837-1839 — Gen. Anastacio Bustamante.
1839 — Gen. Antonio Lopez de Santa Anna.
1839 — Gen. Nicolas Bravo.
1839-1841 — Gen. Anastacio Bustamante.
1841 — Don Javier Echeverria.

DICTATORSHIPS.

1841-1842 — Gen. Antonio Lopez de Santa Anna.
1842-1843 — Gen. Nicolas Bravo.
1843 — Don Valentin Canalizo.

CENTRAL REPUBLIC.

1844 — Gen. Antonio Lopez de Santa Anna.
1844 — Don Valentin Canalizo.
1844-1845 — Gen. Jose Ignacio Herrera.
1846 — Gen. Mariano Parades y Arrillaga.
1846 — Gen. Nicolas Bravo.

FEDERAL REPUBLIC.

1846 — Gen. Mariano Salas.
1846-1847 — Don Valentin Gomez Farias.
1847 — Gen. Antonio Lopez de Santa Anna.
1847 — Gen. Pedro Maria Anaya.
1847 — Gen. Antonio Lopez de Santa Anna.
1847 — Don Manuel de la Pena y Pena.

FEDERAL REPUBLIC — Continued.

1847-1848 — Gen. Pedro Maria Anaya.
1848 — Don Manuel Pena y Pena.
1848-1851 — Gen. Jose Joaquin de Herrera.
1851-1853 — Gen. Mariano Arista.
1853 — Don Juan B. Ceballos.

DICTATORSHIPS.

1853 — Gen. Manuel Maria Lombardini.
1853-1855 — Gen. Antonio Lopez de Santa Anna.
1855 — Gen. Romulo Diaz de la Vega.
1855 — Gen. Martin Carrera.
1855 — Gen. Juan Alvarez.
1855-1857 — Gen. Ignacio Comonfort.

CONSTITUTIONAL PRESIDENTS.

1857-1857 — Gen. Ignacio Comonfort.
1858-1861 — Don Benito Juarez.
1861-1872 — Don Benito Juarez.
1872 — Don Sebastian Lerdo de Tejada.
1872-1876 — Don Sebastian Lerdo de Tejada.
1876 — Gen. Porfirio Diaz, with Gen. Juan N. Mendez as substitute.
1877-1880 — Gen. Porfirio Diaz.
1880-1884 — Gen. Manuel Gonzalez.
1884 (and still in office) — Gen. Porfirio Diaz.
1857-1860 — The Conservative party governed in the capital, during which period the presidents were as follows:
1857 — Gen. Felix Zuloaga.
1858 — Gen. Manuel Robles Pezuela.
1858 — Don Jose Ignacio Pavon.
1858 — Gen. Miguel Miramon.
1859 — Gen. Felix Zuloaga.
1859-1861 — Gen. Miguel Miramon.
1864-1867 — Imperial government of Archduke Maximilian as Emperor.

Recent History.—The more recently made history of Mexico is wholly commercial, industrial, and intellectual. It is Diaz. Revolutions and their attendant horrors have given way to permanent peace, to stable government, to advancement, to growth, and to development.

It has not been possible to refer, even in a brief way, in an article of this character, to more than an infinitesimal part of the events which have gone to make up the history of Mexico. In order, therefore, to supply the deficiency as far as may be, the following chronological summary of the more important incidents which have unavoidably been passed over, is given by way of suggestion to the reader who may wish to look elsewhere for further and fuller information:

1530 — City of Puebla founded.
1535 — First printing press introduced and first book published in Mexico.
1540 — Search by Coronado for the "Seven Cities of Cibola."
1541 — City of Guadalajara founded.
1542 — City of Morelia (originally Valladolid) founded.
1563 — City of Durango founded.
1572 — Arrival of the Jesuits.
1585 — Paso del Norte (now Ciudad Juarez) settled.
1596 — Exploration of Pacific coast by Sebastian Viscayno.
1608 — Santa Fe (New Mexico) founded.
1767 — Jesuits expelled.
1813 — Declaration of Independence.
1817 — Mexico invaded by the freebooter, Mina.
1821 — Treaty of Cordoba.
1822 — Congress organized and three political parties also organized — the Borbonista, the Republican, and the Iturbidista.
1823 — Monroe doctrine proclaimed.
1824 — The United States of Mexico organized.
1828 — Radical, Conservative, and Moderate political parties organized.
1829 — Attempt by Spain to re-claim Mexico.
1834 — Program of government reforms proclaimed.
1835 — Central Republic established.
1836 — Revolt of Texas.
1840 — Empire proposed by Estrada.
1843 — Government centralized.
1845 — Texas annexed to the United States and war between Mexico and United States inaugurated.
1846 — California and New Mexico captured by the United States.
1847 — Advance of the army of the United States under General Scott, from Veracruz to Mexico City.
1849 — Government of Juarez established in Veracruz.

1861 — Payment of debts to foreign countries suspended for two years.
1862 — Defeat of French army at Puebla (May 5).
1863 — Capture of Puebla by French army.
1864 — Juarez's headquarters temporarily established at Chihuahua.
1865 — Paso del Norte made temporary headquarters by Juarez. The United States demanded withdrawal of French troops from Mexico.
1866 — Return of Juarez to Chihuahua.
1867 — Withdrawal of French troops from Mexico. Execution of Emperor Maximillian at Queretaro and return of Juarez to the City of Mexico.
1871 — Re-election of Juarez to the presidency.
1872 — Death of Juarez and elevation of Lerdo de Tejada to the presidency as his successor.
1873 — Incorporation of the "reform" laws into the national constitution.
1876 — Plan of Tuxtepec adopted and general Porfirio Diaz made provisional president.
1877 — General Diaz elected constitutional president.
1880 — General Manuel Gonzalez elected President to succeed General Diaz.
1884 — General Diaz elected President to succeed General Gonzalez.
1888, 1892, 1896, 1900, 1904 — General Diaz elected President to succeed himself.
1905 — Monetary reform law enacted.
1911 — President Diaz abdicated and left Mexico.

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ELISHA HOLLINGSWORTH TALBOT,
Author of 'Commercial and Industrial Mexico.'

4. Mexico—Government. The constitution of Mexico is based upon that of the United States, which it very much resembles. Like the United States the republic is formed into states free and sovereign in so far as their local affairs are concerned. But, for administrative matters which concern the interest of the states in general and as a whole, they are united under a federal government. In virtue of the constitution of 5 Feb. 1857, the national power resides in the people, who are theoretically the fountain of all public authority. In representation of the people the government of the country is carried on by the national government for the federation and by the state governments, each for its own state. But no state law must conflict with the general good as expressed by the laws of the federal government.

No slaves are allowed to be held in the country and all persons born in the republic are free and equal in the eyes of the law. The constitution asserts the right of every one to freedom of thought, profession and occupation. Education is free to all and the government is making strenuous efforts to educate the masses of the people. In so far as it is consistent with private rights and the exigencies of state, the press is free. In Mexico one may publish what he pleases, for there is absolutely no press censorship; but the libel laws are very strict and are intended to protect the citizen; and one may be imprisoned for libel or defamation of character.

The right to associate together for any lawful undertaking, business or enterprise is recognized fully by the law; and the complete individuality of every law-abiding citizen of the republic or resident therein is recognized, and he may enter or leave the country without a passport.

The right to petition the government is conceded to every citizen of the republic and he is protected in the same.

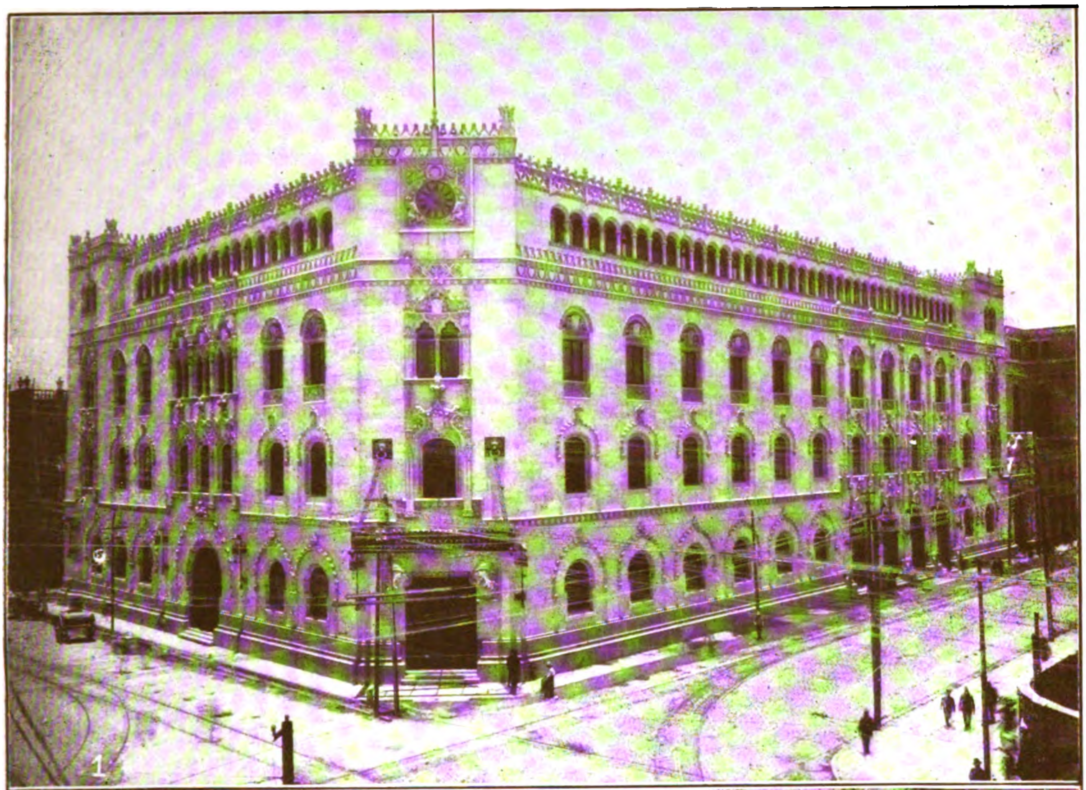
No person may be compelled to work for another, even though he may have formally agreed to do so, and may have been paid in advance for his services; and, if he do work, the law assures him payment for his work.

The country being essentially a republic, hereditary honors and all titles of nobility are not recognized, and no one connected with the government is permitted to accept or wear same unless by a special act of congress.

Arms may be carried for lawful personal defence. In certain districts a permit must be secured to carry arms; in others where there is need of them constantly, as in the wild mountain regions and mining camps, this permission is not obligatory.

Search without warrant is prohibited, and a policeman may not enter a private house without an order from the police court, unless it be in pursuit of a well-known criminal or one caught in the act of breaking the law.

As all are equal in the eyes of the law, privileged tribunals, such as were customary



1. General Postoffice. City of Mexico.

2. Corridor in the General Postoffice.

Photos by Kahlo, Mexico

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during the Spanish occupation of the country, are strictly prohibited. Thus every man, be he priest or layman, citizen or administrative officer of the government, is ruled by the one common law.

By the constitution of the republic the passing of all laws contrary to the interests of the country is also prohibited; and no treaties with other countries can be made for the extradition of political criminals.

By the law of the country and the conditions of the constitution, offences against law and order are divided into two great classes, namely, civil and criminal. No one may be imprisoned for any offence coming under the first head. This includes debts and all monetary obligations, provided there is nothing criminal about their contraction.

A person, once arrested, must be brought to trial within three days, and just cause shown for his detention or he must be set free; and whipping torture, mutilation and other punishments of a like nature, which were common enough in previous periods of the history of Mexico, are declared contrary to law; and all punishments, except those of a correctional nature, must be administered by judges of the criminal courts.

The death penalty is practically never used in Mexico. It is stipulated in the constitution that it may be applied in cases of high treason, premeditated murder, parricide, and highway robberies. About the only cases in which it is now applied is that of offences of a most serious nature against the military authority.

In all legal action one may appeal from a lower to a higher court until the supreme court of the nation is reached and gives its decision, which is final. But in cases of the death penalty, an appeal may be made to the clemency of the president of the republic. And once a man has been tried and acquitted he cannot be tried again.

In conformity with the principles of democratic government, no spying upon the private acts of the subjects of the republic is permitted and, therefore, all correspondence is declared inviolable.

In times of peace the quartering of soldiers upon private individuals is prohibited, and even in times of war it can only be done in conformity with certain regulations of congress, and with orders issued to fit the exigencies of the situation. This is only an extension of the law which recognizes the right to private property, which is guaranteed against the interference of a second person.

The constitution provides for the issuing of patent rights to inventions of use to mankind, for a certain length of time. It also recites the right of the government to a monopoly of the coinage of the money of the republic. By the constitution it is also given control of the postal system and such other public utilities as it may see fit to acquire in the interests of the prosperity of the country.

In case of serious internal disorder of whatever character which threatens the safety of the state or the government, the president has the right to suspend the constitutional guarantees; also in case of foreign invasion; but this must be with the consent of the cabinet and the congress or the congressional committee in case the congress be not in session.

Neither the church nor any kind of ecclesiastical bodies are allowed to acquire property. Therefore the church holds no property in its own name in Mexico.

The law with regard to Mexican citizenship is as follows: All children born of Mexican parents, whether in Mexico or in a foreign land, are, in the eyes of the Mexican law, Mexican citizens. Foreigners may become Mexican citizens by naturalization. All persons acquiring land in Mexico, by virtue of this acquisition, become Mexican citizens unless they distinctly state in their deed of acquisition that they reserve their right to the citizenship of their own country.

All Mexican citizens, whether native born or naturalized in any of the above indicated ways, are liable to military service.

All persons residing in the republic are guaranteed the protection of the laws of the country.

In Mexico marriage is a civil contract, and no other marriage ceremony except the civil one is legal. Therefore there are generally two marriage ceremonies performed, the civil one by a magistrate appointed by the government for that purpose, and one by the minister or priest of the church of which the contracting parties are adherents. This is a natural outcome of the separation of Church and State which took place in Mexico in 1873, as a result of an amendment to the constitution of 1857.

All religions which are not inimical to the interests of good government and the laws of the country are allowed to exist and to exercise their functions in Mexico. But, owing to the abuse of the Church in the establishment of monastic orders, and the undue influence exercised over parishioners to obtain wealth for these and other religious institutions, all monastic orders have been suppressed in Mexico.

As already stated, the government of the country is divided into federal and state, and the latter is subdivided into three branches, executive, legislative, and judicial. The chamber of deputies and the senate, constituting the congress of the union, are the legislative bodies, and by them alone can laws for the government of the country be enacted.

Two sessions of congress are held each year. The first, which begins on the first day of April, lasts from two to two and a half months; and its primary business is to audit all accounts of the previous year and to arrange the estimates for the incoming fiscal year.

The second session, which begins on the great national holiday, September 16, lasts from three to four months.

According to the laws of the country, there shall always be a president and a vice-president, and a cabinet composed of eight ministers, corresponding to the following departments of the government: Fomento, (encouragement) Foreign Affairs, Department of the Interior, Justice, Public Instruction and Fine Arts, Finance, Communications and Public Works, War and Marine. Each minister has charge of his own department of the government; and everything connected with his department theoretically passes through his hands, and all documents belonging to the department and issued by it are signed by him.

The judiciary consists of primary and supreme court; and cases adjudged by the primary court may be appealed and carried to the supreme court, from which an appeal may be made in cases of capital punishment to the president of the nation.

The revenues of the nation are derived from customs duties, stamp taxes, by contributions from the several states of the union and known as federal contribution, and from internal revenue taxes and other minor sources.

5. **Mexico — Religion.** The establishment of the Christian religion in Mexico dates back to the year 1517, when the Roman Catholic Church was founded in Yucatan, coincident with the discovery of that territory by a wealthy Cuban merchant named Cordova. One year later the bishopric of Yucatan was created but never occupied, because of unanticipated conditions attending and immediately following the Spanish conquest. In 1525, however, it was succeeded by the bishopric of Puebla, with dominion not only over Yucatan, but Puebla, Oaxaca, and Chiapas. In 1545 this was raised to an archbishopric, and in 1571 the archbishop was promoted to be Primate of New Spain. The first bishop to serve in Mexico arrived at Veracruz in 1528. Not until 1863, after 335 years of constant though varying growth was the Church divided into archdioceses, three of which were established in that year.

The history of the Inquisition in Mexico dates from 1571, in which year the first tribunal of that dreaded institution was founded, not to be suppressed until 1820, five years after its last victim, —the patriot Morelos, in whose honor one of the states was later named,— had by its orders been shot to death. The first "burning place," or scene of torture and execution by command of this tribunal, was on the spot now occupied by the beautiful park known as the Alameda.

Until 1859 it had been the fixed policy of the Church to acquire as much property, both real and personal, as possible; and it has been stated that in the year named its possessions included fully one-third of the wealth of the country. In the accomplishment of this purpose and generally in advancing the power of the Church and strengthening its hold upon people and government, the three most powerful influences were the Jesuit, Franciscan and Dominican orders. The Jesuits were expelled in 1856, and four years later all the other male religious orders were abolished by Juarez and those under his leadership. When, in 1874, the laws of reform became a part of the federal constitution, the establishments conducted by the Sisters of Charity, the only remaining religious order of females, were suppressed; since which time no member of an organization of this character has been permitted to pursue her vocation as such, within the boundaries of the republic.

In 1889 the Catholic Church of Mexico was represented by 1,349 vicarages and parishes, and 8,763 churches and chapels. In 1900 there were six archbishoprics, 23 bishoprics, and one vicarage apostolic. In the same year there were in the republic, according to the Department of Fomento, 13,533,013 Catholics, 51,795 Protestants, 90 Mohammedans, 1,421 Mormons, 2,090 Buddhists, 145 Israelites, 64 Greeks, and 18,640 without religious affiliations.

The first Protestant missionary to enter the Mexican field was a woman,— Miss Matilda Rankin,— who began work there some 40 years ago. In 1869 the "Church of Jesus in Mexico," was established, its promoters declaring in their declaration of principles that they "desired a greater liberty of conscience, a purer worship, and a better church organization." In the same year the Rev. Henry C. Riley, a Protestant Episcopal clergyman, went to Mexico, his efforts and those of his coworkers resulting in the organization of the "Church of San Francisco." The congregation worshipped in a building located on the spot which had been occupied by the gardens and wild beast house of the Kings of Tenochtitlan. The Presbyterian Mission entered the field in 1873, the Methodist Episcopal Church following closely, in the person of the Rev. William Butler, whose son, the Rev. Dr. John W. Butler, followed a few months later and is still in active work there; he in turn being followed by other Protestant organizations until, by 1889, there were in the republic 88 Protestant churches and chapels, 21 of which were in the capital, 13 in the state of Michoacan, 13 in Puebla, 10 in Morelos, 5 in Mexico, 3 each in Hidalgo, Tamaulipas, and Veracruz, 2 each in Queretaro, Jalisco, Tabasco, and Zacatecas, and 1 each in Tlaxcala, Aguascalientes, Nuevo Leon and Tepic. Miss Rankin, referred to above, confined her work to Monterey and vicinity, where she remained some 20 years.

The number of Protestant congregations now in Mexico is over 900, with an actual membership of at least 20,000, and not less than 100,000 "adherents," or attendants, all of whom are Protestants in belief, although not yet enrolled as members of any particular denomination. Of the 20,000 actual membership, 6,000 are Methodists and 6,000 Presbyterians, other denominations lining up as to membership in the following order: Methodist Episcopal Church South, Baptists, Congregationalists, and Episcopalians. Other denominations are represented, but only by a limited membership. Over 15,000 children now attend the numerous schools conducted by the Protestant churches. The Methodist Episcopal denomination supports a hospital at Guanajuato and dispensaries at Silao and Leon; the Methodist Church South is doing medical work at Monterey and San Luis Potosi, the Baptist Church at Leon, and the Adventist Church at Guadalajara.

Everywhere in the republic there is unrestricted freedom of worship, and the same respect is shown and protection extended to Protestants as to Catholics, notwithstanding that the religion of the latter has always been the ruling one of the country and now has a hundred and thirty times as many followers as have all the others combined. Some idea of the value of Church property being acquired by the Protestant denominations may be formed from the fact that the Methodist Episcopal Church alone possesses not less than $500,000 worth (gold valuation).

The Catholic Church of Mexico has not been permitted to own the buildings in which it worships, nor has its clergy been allowed to appear in public, exposing to view any insignia of its calling, or conducting any procession or religious ceremony, since 1859, in which year Church and State were divorced forever, in this country. There does not exist a convent, either for nuns or friars, in all the land; and the Catholic houses of worship are only occupied at the sufferance of the government, by which they are owned.

It was stated at an evangelical assembly held in the City of Mexico in February 1888 and composed of "the various Protestant denominations and evangelical societies conducting missionary operations in Mexico," that there were at that time 600 Protestant congregations, 192 foreign and 585 native "workers," 7,000 attendants at the Protestant day schools, 10,000 at Sunday schools, 18,000 communicants, and a Protestant community of 60,000 souls in the republic.

The famous Catholic Cathedral in the City of Mexico cost, for its walls alone, over $2,000,000 and was 96 years under construction. It is 426 feet in length and 203 feet in width, has two great naves, 20 small side chapels, one of the grandest altars in the world, supported by immense columns of white marble, and is surmounted by five imposing domes and two open towers 218 feet high. A magnificent balustrade with 62 statues of rich gold, silver, and copper alloy, and an elaborately carved choir enclosed by railings of tumbago weighing 26 tons and valued at $1,500,000, are the most notable features of the interior of this historic edifice. In the almost equally famous church of Guadaloupe, a few miles distant from the capital, several tons of pure silver were employed for various useful or decorative purposes. The great cathedral in the city of Puebla is regarded as more beautiful in its interior finish, decorations and general design than any other church edifice on the American continent.

JOHN W. BUTLER.

Author of 'Sketches of Mexico in Prehistoric, Primitive, Colonial and Modern Times.'

6. Mexico — Education. To the credit of the enlightened and progressive men who have for the past quarter of a century had actual control of the destinies of Mexico, the subject of education has received its full share of attention; and the results accomplished give eloquent testimony to the wisdom and earnestness of their efforts. When General Porfirio Diaz was first elected President, in 1872, there were only about 4,000 public schools in the entire republic. From the coming of the Spaniards the chief interest in education had been confined to the higher branches,— to the establishment of seminaries, colleges, and universities,— and the primary or fundamental branches were neglected. Under the policy inspired by President Diaz there has resulted a phenomenal increase of schools and attendance. In the period between 1872 and 1891 schools of all classes had increased from 4,250 to more than 10.000 and the total attendance from 160,000 to 649,771; and from 1866 to 1891 the attendance of mestizos (half-breeds), from 16,000 to 235,000, and of Indians from about 8,000 to 170,000. In 1891 the total attendance was 722,435, and the entire cost of maintenance was $4,068,300, which sum was paid by the federal and state governments. The average cost per capita was $5.63. In 1903, the number of primary schools supported by the federal or state governments was 6,350; and by municipalities, 2,955; total, 9,305; and the attendance was 484,570 — males, 299,289; females, 185,281. The total number examined as to proficiency was 413,157, of which 333.501 were "approved" and 26,418 completed their studies. There were 49 secondary and preparatory schools supported by the federal and state governments, with an attendance of 5.561, of which 4,056 were males and 1,495 females, the number examined being 4,878, and "approved" 4,046. Of the latter, 388 completed their studies. In the same year there were 37 "professional" schools, with an attendance of 2,834, of which 1,667 were males and 1,167 females; number examined 2,443, "approved" 2,298, graduated 221; total number of teachers and other employees of public schools, 18,024; expenses, $8,454,329. Number of private schools same year, 1,790; number supported by the clergy, 437; and by associations, 150. Of these 2,339 were primary, 29 secondary, and 9 professional; attendance 60,087 males, 52,916 females — total 113,003; number examined, 79,351; "approved," 67,695; and 4,939 completed their studies. The grand total of schools of all kinds was 11,794 and attendance 605,968, of which 365,099 were males and 240,859 females.

The number of public libraries in 1903 was 135, containing 743,559 volumes; number of museums 37, of which nine were achæological, seven scientific, seven natural history, one geological and metallurgical, three agricultural, one medical and anatomical, one industrial, two commercial, and six miscellaneous. There were 56 scientific and literary societies and 429 publications, of which latter 10 were dailies, 10 tri-weeklies, 30 semi-weeklies, 225 weeklies, 4 tri-monthlies, 57 semi-monthlies, 6 monthlies, and 11 irregular. Of the total number, 43 were official organs, 56 political, 36 religious, 41 scientific, 61 literary, 4 scientific and literary, 5 musical; 74 were devoted to general information, 12 to commercial topics, 14 to education, 16 to industries, 12 to art, and 65 to miscellaneous subjects and interests.

In 1900 there were 1,273,325 males and 906,263 females who could read and write; 163,568 males and 184,335 females who could read but not write; and 3,119,944 males and 3,664,680 females above the age of 12 years who could neither read nor write.

A law was enacted in 1888 but not put into force until 1896, making elementary education compulsory and compelling the establishment and maintenance of at least one public school for every 4,000 inhabitants. Under the provisions of this law the advance in education and educational methods throughout the republic has probably been without a parallel.

The early history of education in Mexico is particularly interesting. In 1529, or 377 years ago, the College of San Juan de Letran was established in the capital and threw its doors open to Spaniards and Indians alike. The first university was opened in 1553 by special permission of the King of Spain. In 1573 two colleges,— those of San Gregorio and San Ildefonso,— were opened, two others and a divinity school being established a few years later. Thus it will be seen that seven institutions of higher education were in operation in Mexico before the close of the 16th century. It was not until 1578 that the science of medicine was recognized as meriting a place among the branches of higher education, the first chair of medicine being established in that year. Twenty-one years later another medical professorship was founded, and in 1681 anatomy and surgery were added. In 1768 the Royal College of Surgeons was established in the City of Mexico and still enjoys a most useful and prosperous existence as the National School of Medicine, the new name having been adopted in 1845. Its home is in the great building made famous as the scene of the indescribable horrors of the Spanish Inquisition. The Mining College or School of Engineering, established in 1793, occupies an edifice built by the Spaniards at a cost of $3,000,000, and is in a most flourishing condition. Although these heartless conquerors of one of the noblest and most ancient races of the world seem to have been inspired by avarice, cupidity, and brutality in their treatment of the simple people conquered by them, it cannot be denied that they were sincerely devoted to the cause of higher education, contributing most liberally from public revenues and private fortunes to its advancement. In the City of Mexico was founded in 1551, by the Spanish crown, the first university in America,— almost 200 years before the independence of the United States was accomplished. The building, which is still in a good state of preservation, is now occupied by the National Conservatory of Music. The National Academy of Art occupies the building which was the home of the first school of the new world,— a school for Indians; the normal school for males and its companion school for females occupy historic buildings completed respectively in 1678 and 1648; the Jesuit College of San Ildefonso, erected in 1749 at a cost of $400,000, is now the home of the National Preparatory School; the Manual Training School for boys occupies a building erected in 1598; the National Library, with its more than 200,000 priceless volumes, was formerly the Church of San Augustin; the building in which is now located the National Museum dates back to 1731 and cost $1,000,000, and a college for young women now occupies a grand structure completed in 1734 at a cost of $2,000,000. Thus are education and history closely intertwined. In 1824 Humboldt wrote: «No city of the new continent, not excepting those of the United States, presents scientific establishments so great and so solid as those of the capital of Mexico.»

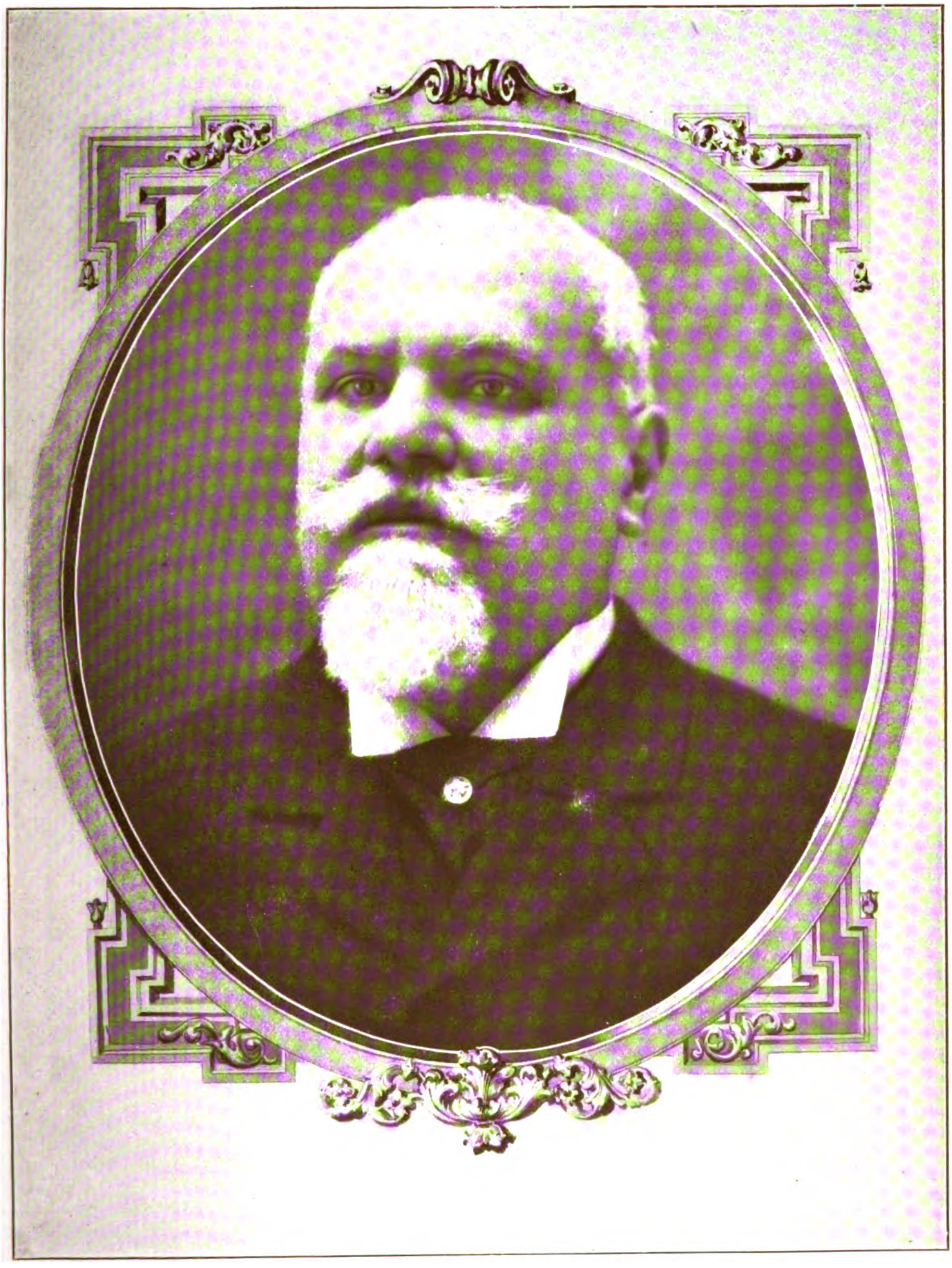
It is safe to say that no important country in the world devotes as much official attention to education, both primary and advanced, or directly contributes so largely from its revenues, to the advancement of learning among the masses, in proportion to its means, as does Mexico. And this assertion applies alike to the federal, state, and municipal governments, by all of which this great cause is placed above every other. Nor have the devoted men and women in charge of this work had to deal with intellectual density, by any means; but rather with a condition of ignorance for which these people have themselves been blameless; for not only the half-breeds but the Indians are capable of great mental development. They are naturally intelligent, receptive, quick to understand, and are possessed of phenomenally retentive memories. They had only needed opportunity and encouragement.

In most of the states, schools for the care and instruction of orphans are maintained at the public expense, in which both sexes are given the advantages of a primary education, and where boys are taught the ordinary trades, and girls are instructed in the various occupations pertaining to the sex. In these noble charities, as well as throughout the entire educational machinery of the republic, modern methods have been adopted, and system, progress, and thoroughness prevail. Everywhere there is manifested the deepest interest in the uplifting of the masses through the most effective of all agencies — education. As a rule, the immediate surroundings of schools of all classes are being rendered constantly more attractive and refining in character, and sanitary and hygienic advancement has been most marked. The percentage of illiteracy and criminology is being notably reduced; the standard of morals is rapidly advancing, and the conditions which affect the public health are being constantly improved. In framing its school laws, Mexico has paid a very high compliment to the United States, by almost literally adopting its thoroughly tested system and employing its proven methods. With the passing of another decade the wisdom of this course will receive still further and more pronounced illustration.

Conspicuous among the means of education in Mexico are the public libraries, museums, art schools and collections, literary and scientific societies, and periodicals. The National Library, which has a delightful and very convenient building and location in the capital, is indeed a noble institution. In its collection of more than 200,000 volumes are many rare books and manuscripts, the value of which is not to be stated in dollars and cents. Among these are works by early Spanish historians and scholars, which, having been written before the art of printing was known, cannot possibly be duplicated. In most cases these not only possess great literary merit but strikingly illustrate the possibilities of penmanship as an art and of illuminated title pages and initial letters. A very large proportion of the volumes in this library were originally the property of the church or of the priesthood, and were confiscated by the government during the progress of the war of reform, to prevent their destruction or removal, as well as to place them where access to them could always be had by the public. Naturally, most of them deal only with religion or history in some of the many phases of these broad subjects or departments of learning. Of similar character are most of the libraries which have been assembled and are supported by the several states.

While there are some 40 public museums distributed throughout the republic, many of which are quite extensive and all of which are exceedingly interesting and instructive, far greater importance attaches to the one located in the City of Mexico and supported by the federal government, than to all the others combined. Although this has only occupied its present quarters in the National Palace since 1865, and was not actually established until 1831, in which year the collections previously belonging to the Conservatory of Antiquities founded by Emperor Iturbide in 1822, and to the Royal University, to which Viceroy Bucareli y Ursua had in 1775 transferred the remnants of a most valuable collection of maps, hiero-

MEXICO.



JUSTO SIERRA.

Univ. Library, UC Santa Cruz 2001

glyphs on skins, manuscripts, etc., were in 1831 consolidated under the name of the National Museum, its origin really dates back almost 133 years. Here the student of archæology, of ethnology, or of any other department of the ancient history of the American continent, or of the peoples who have at different periods dwelt upon it, may find greater wealth of materials for investigation and study than exists in any similar institution in the western world.

While there are also a number of very important art collections in the principal state capitals, the National Gallery, located in the City of Mexico, holds unquestioned pre-eminence. In this, as in every other department of intellectual or material development, individual effort is in a most practical manner promoted and encouraged by the government; and as a result there is constant and marked advance in the growth of art in all its features. Chief among the influences that have accomplished and are accomplishing so much in this direction is the National School of Art. The federal government will shortly erect in the City of Mexico, a palace of art, in the further encouragement of native talent and ambition, which will rival any similar institution on this continent.

Of literary and scientific societies there are many. Every considerable community is the home of one or more of these associations, some of which have been in existence many years, and all of which have well served a noble purpose. The average educated Mexican is a fluent, even an eloquent speaker, as well as a versatile and graceful writer. In the work of education a very important part is performed by the periodicals of the country, a large percentage of which is especially devoted to pedagogy, art, or the sciences. Among them are representatives of almost every phase of advanced, religious, political, or other thought.

ELISHA HOLLINGSWORTH TALBOT,
Author of 'Commercial and Industrial Mexico.'

7. Mexico—Literature. Of Mexican literature written previous to the Spanish conquest of the country little exists, and that little in the form of translations into Spanish. However, this is of a sufficiently lofty and poetical character to lead us to believe that the Mexican people, and especially the Texcocans, really had a literature worthy of preservation.

Around the romantic career of Netzahualcoyotl, king of Texcoco, who reigned shortly before the Spanish conquest, there clusters many a legend and story. By early Spanish writers on Mexican subjects and by native Mexican writers immediately following the Spanish conquest, he is asserted to have been a great and inspired poet. But poetry was a gift of the Mexican races; and the stories and legends which still exist in the mouths of the poor and ignorant Indians are often strikingly imaginative, poetical, and beautiful. Notwithstanding the discredit that has been cast upon the stories of literary culture in Texcoco in the time of Netzahualcoyotl, there is little doubt that the people of Texcoco represented the highest culture of the poetical races of old Mexico; and, as such, it would not have been strange if, as was asserted by early Spanish writers, the court of Texcoco was given up to literature, science, and culture, of which the king was himself the leading spirit.

This belief finds curious confirmation in the fact that, immediately following the conquest of Mexico, the native races produced many literary men of talent, who have left us much of the information which we now possess of Mexico previous to the coming of the Spaniards.

Owing to the unsettled condition of the country, the oppression of the native Mexican races, the wild quest of the Spaniards for gold, and the general contempt for learning which gradually took hold of New Spain, this early enthusiasm for letters disappeared; and the only records we have of these times, are to be found in the chronicles of the religious orders of the 17th century. Though these are of great historical value, they are not always entertaining reading. Among these chroniclers the most important are Agustin Betancourt, Beltazar de Medina, Motolina, Antonio de la Rea and Geronimo Mendieta.

However, in the darkness of this period, there are three names which have won international reputation. These are Carlos de Siguenza, Sor Juana Inez de la Cruz and the dramatist Alarcon, the latter of whom was received with open arms in Spain, where his dramas were very popular.

Toward the close of the 17th century Mexican literature began to revive again and, we have three names which are known wherever the Spanish language is read. These are Clavigero, Gama, and Veytia, all historians of note. To these must be added the names of Manuel Navarrete, who wrote fervid religious poetry; De Lizardi, the greatest thinker of the pre-revolutionary times, and Tagle, the herald of the revolution, a poet of force and inspiration, but of little culture.

In the first part of the 19th century, the names of Gorostiza, Carpio, and Pesado stand forth above all others for their brilliancy of thought and expression and the earnestness which inspired them. This earnestness was a part of the spirit of the times induced by the strenuous life which the threatening revolution and the unsettled condition of the country inspired.

From this time on Mexican literature is not without names of note, the principal of whom are, from the early part of the 19th century, Alpuche, the renowned dramatist, Calderon, Jesus Diaz, Galvan, the romantic and lyrical poet and dramatist, Martinez, and Segura. But of all the names of this period the greatest is easily that of the poet Guillermo Prieto, the great high priest of the reform movement, and narrator of the glories of the nation and the customs of the people.

Contemporaneous with Prieto were Ignacio Ramirez, "El Necromancer," who fought valiantly for the independence of his country, and Collado, a poet who helped to create a desire for a national literature.

Escandon, a classical poet; Diaz Mirón, a noted writer and singer; Aldana the dramatist; Isabel Prieto de Landázuri, also a prolific dramatist; Ortiz, the Classical poet; Covarrubias, the young soldier who died while on the threshold of fame; Moreno, a sweet and simple poet of nature; Flores, the blind epic bard, and

Altamirano, the «inspired Indian» are a long list of names that would do honor to any country. They seem to have been inspired with the restless longing of the times, the unsettled condition of the country and the ever-changing panorama of life and action around them. But, though every man of those mentioned above was more or less in sympathy with the condition of his country, two names stand out above all others in their ability to feel every pulse of the times and the people. These are Vicente Riva Palacio and Ignacio M. Altamirano. Both men were fighters, both in a literal and literary sense, and they pictured vividly and realistically the stormy times through which they passed.

Manuel Acuña stands by himself as the most lyrical, rhythmic, and poetical of the poets of the latter part of the 19th century. Gutierrez Nájata — «El Duque Job,» Justo Sierra, Juan de Dios Peza, Antonio Zaragoza, Manuel Othón, Peon Contreras, Juan A. Mateos, Roa Bárcena, are names that have raised Mexican literature to a higher pinnacle. They represent a movement in every branch of literature, lyric poetry, pastoral and heroic poetry, history, criticism, philosophy, science, comedy, and the drama. These men created a new literature for their country and their names are all known wherever Spanish is the language of the people.

But, in addition to these, there are many minor names which, in a less fruitful literary period, would have been names of prominence. As it is they have all done work worthy of mention. Santiago Sierra, brother of Justo Sierra, and a young poet of great promise, died at the age of 30; Cuenca, one of the relatively greatest poets of Mexico, died at the age of 34; Dominguez, the poet of sweet melancholy; Esteva, the painter of national customs; Roa Barcena, the poet and historian of the Imperialist party; Blengio, a successful sonnet writer; Pagaza, noted for the classical finish of his verses; Rincon, the Hood of Mexico; Justo Sierra, novelist, historian, chronologist, critic, educator, and lyrical poet; Sosa, biographer, journalist, bibliographer, and historian; Zayas Enriquez, lyric poet and dramatist; Cosmes, journalist and poet; Rojas, lawyer, statesman, journalist, and poet; Caballero, lyric and pastoral poet and journalist; Camara, romantic poet; Laura Mendez de Cuenca, a prolific writer of varied talents and imagination; Delgado, novelist and poet; Salvador Diaz Mirón, orator of note and one of the best lyrical poets of to-day; Parra, a noted writer on all kinds of scientific subjects, and a gifted poet; Gonzalez, Llorente, and Canton, poets and prose writers; Luchichi and Acal poets and critics; Carvajal, lawyer, journalist, and poet.

But when all these are mentioned there is still a list of respectable length of the younger poets and writers who have already made a place for themselves. The most noteworthy of these are: Fransico A. de Icaza, Ignacio Ancona Horruytiner, Balbino Dávalos, Enrique Fernandez Granados, Jose M. Bustillos, José Peon del Valle, Jose I. Novelo, Luis G. Urbina, Manuel Larrañaga y Portugal, José Juan Tablado.

In this long list there is one name omitted, which, in importance rises above all the others. This is that of Juan de Dios Peza, who, next to Guillermo Prieto, is the most popular poet Mexico has produced. He is, in addition to this, a noted journalist and orator.

Orozco y Berra, who died in 1881, was one of the most painstaking and intelligent historians, and his works on the primitive history of Mexico and the Spanish conquest are standard authorities.

Riva Palacio is the most original and keenest literary critic Mexico has produced, and his historical novels are the best of their kind. He is always accurate, correct and logical, and his wealth of illustrations, his story-telling faculty, his imagination, his humor and his dramatic power, make him one of the most original literary men in Mexican history.

To Joaquin García Icazbalceta Mexico owes much for the careful and intelligent manner in which he has collected together documents for the history of Mexico. He is a poet of note and one of the most forcible writers in Mexico.

Alfredo Chavero, as historian, archæologist, editor, and statesman, has long been a prominent figure in Mexican literary and political life.

José Maria Vigil, as poet, historian, educator, journalist, and dramatist, has done much to advance the standard of literature in Mexico.

Roman Manterola deserves a word of mention. He is the most famous philosopher the American continent has produced, for he has thrown aside the philosophies of other countries and has worked out his own system. To him the bases of all true philosophy are the necessities of human life, whether they be actual necessities, or those pleasures and adjuncts which go to make life more perfect. He is in the strictest sense a utilitarian, but, withal, a very pleasant one.

The literary work done by Mexico in the line of comedy and drama is remarkable. Many of these dramas are the equal of those written in Spain by the most noted of modern dramatists; and this work is not confined to one writer, for there are at least half a dozen who would attract attention anywhere. Mexican writers are naturally good dramatists, for they have the sense of action and the imagination which, with the proper selection of characters and scenes, form the elements of the drama.

As in the past, the caste feeling has been so strong, it has been almost impossible for the people of the middle and upper classes to enter into the lives of the lower classes; for this reason this class of the people have entered, to little or no extent, into the literature of the Mexican literati. Thus, many of the writers, especially of the novel, have found their inspiration out of their own country; and those who have found their subjects and characters at home, have treated of middle and upper class life. So, therefore, the literature of the country has not, as yet fully developed all the sides of national character. So the coming literary men of Mexico have still a wide and interesting field in which to pursue their literary labors.

For this reason, though there have been a good many novels written by Mexican writers, this department of the Mexican national literature, contrary to that of Spain of the same period, is the least interesting. Poetry, the drama, history, literary criticism, and works on sciences and political subjects form the great bases of the literary productions of Mexican authors. And this has its origin in the conditions already mentioned, which have caused a want of unity in the national life, and, until this is bridged over, we will probably never have the great and distinctively Mexican novel. Of all the writers of Mexico, Juan A. Mateos comes the nearest to producing a distinctively Mexican novel. But, though many of his stories are purely Mexican, yet he deals, for the most part, with the heroic characters of his times, and so does not give us a complete picture of Mexico.

No sketch of Mexican literature would be complete without some reference to the historical writers who form such an important part of the literary movements of the different literary periods of the country.

Following the Spanish conquest of the country most of the literature of Mexico was written by Spanish monks and priests, and, under their direction, by native Indian princes and noblemen, who had been educated in church schools established by the Spaniards.

Of the early Spanish writers who devoted themselves to Mexican history the most noteworthy was Bernal Diaz de Castillo, the rough old captain who fought with Cortez throughout all his campaigns from the time he first set foot in Mexico to the day when all Mexico was declared subject to the Spanish crown. The priest, Bernardo de Sahagún, has left us the most complete account of the customs, habits, political institutions, religious beliefs, ceremonies, and ritual, which we have of the Mexican people at the time of the conquest. Ixtlixochitl, in his historical works and his accounts of the Chichemecas, has given us the standpoint of a native Indian prince, educated under the Spaniards. While his histories are interesting they have evidently been influenced by his desire to show the importance of his own little kingdom in the Aztec confederacy. Juan de Torquemada has left us 21 books of very interesting information about the people of Mexico in his day, and he has also given us an account of the Indian monarchy at the time of the conquest and the following years.

Of the other writers on historical subjects the following are noteworthy, and all have written works of interest to students of Mexican history: De Zurita, ‘A Short Summary of the Relations of the Chiefs of New Spain;’ Molina, ‘The Conquest of Yucatan;’ Leon, ‘Annals of the Museum of Michoacan,’ ‘The Last Days of Ocampo,’ ‘The Printing Press in Mexico;’ Icazbalceta, ‘A Collection of Documents for the History of Mexico;’ Chavero, ‘Ancient History of Mexico;’ Clavijero, ‘Ancient History of Mexico;’ Muños, ‘History of Tlaxcala;’ Tezomoc, ‘Mexican Chronicle;’ Orosco y Berra, ‘The Tonamatl,’ ‘Money in Mexico,’ ‘Notes for the History of Money and Coinage in Mexico from before the Conquest;’ Solis, ‘History of Mexico;’ Bustamante, ‘The Mexican Revolution,’ ‘The Voice of the Country,’ ‘Data for the History of the Government of Santa Anna,’ ‘The New Bernal Diaz;’ Antuñano, ‘Documents for the History of Industry in Mexico;’ Diaz Covarrubias, ‘Public Instruction in Mexico;’ Arrangoiz, ‘Documents for the History of the Second Mexican Empire;’ Guerra, ‘History of the Revolution in New Spain;’ Hernandez, ‘Collection of Documents for the History of the Independence of Mexico;’ Mora, ‘Mexico and her Revolutions;’ M. Riva Palacio, ‘Notes on the Trial of Maximilian;’ Vicente Riva Palacio, ‘History of the Administration of Sebastián Lerdo de Tejada;’ Hidalgo, ‘Notes for a History of Monarchial Projects in Mexico,’ ‘History of the Revolution in Mexico against the Dictatorship of Santa Anna;’ Ruiz, ‘History of the War of Intervention in Michoacan.’

The following is a fairly complete bibliography of Mexican authors:

Acuna, Manuel (1849–1873), is the Chatterton of Mexico, the marvelous soul that perished in his pride. A great critic has said that the name of Acuña alone would be sufficient to give Mexico the right to say that she had a literature and a glorious one at that. Acuna was a deep thinker, a poet of most vivid imagination with a heart sensible to all the beauties of nature and all the sentiments and feelings of the human heart. In a fit of despondency over an unsuccessful love affair he committed suicide. In Mexico Acuña is pointed to with pride as the perfection of poetic fervor and beauty of imagination and sentiment. His works are purely poetical and principally lyrical.

Aldema, Ramon (1832–1852), was a lawyer, journalist, politician, poet and dramatist. His dramas have been repeatedly produced in Mexico with success. Of these the most noted are: ‘Felicity and Honor,’ ‘Nobility of Heart,’ ‘A Pledge of Vengeance,’ and ‘Head and Heart.’

Altamarino, Ignacio M. (1834–1893), one of the greatest thinkers and most fervid writers that Mexico has produced: was a pure Aztec Indian. Like Juarez, the great Indian president, he was 14 years old before he received any kind of education, with the exception of the very rudimentary notions of learning which were then taught in the primary schools in the Indian villages of the interior. Step by step he climbed until he was recognized as one of the greatest scholars of his day in his own country. Altamirano was a polished prose writer, and an inspired poet, a critic, biographer, journalist and novelist. In his day, he did more to influence Mexico for the revolution than any other man. The book by which Altamirano will probably be longest remembered is ‘Landscapes and Legends’ (1884). He was consul-general of Mexico in Spain and later in Paris.

Barcena, Jose Maria Roa (1827– —). Of all the Imperialistic writers of Mexico there is one name which stands out above the others, that of the late Jose Maria Roa Barcena. On five different occasions during his life, Barcena published volumes of poems, all of which became popular. Many of these poems have been republished in Madrid, and translations have been made into Italian and French. In addition to much poetry Barcena wrote novels, history, and a book of ‘Legends of Mexico.’ The book which will probably have most interest for Americans is ‘Recollections of the American Invasion, 1846 to 1847.’ Barcena's shorter stories are the best that Mexico has produced. They have all the mystecism of Poe, with considerably more humor.

Blake, Wilson Wilberforce (1850– —), (M.A. Monmouth College). Author of ‘The Cross, Ancient and Modern,’ (New York 1889); ‘The Aztec Calendar,’ ‘The Antiquities of Mexico,’ (New York 1891); ‘Tourists’ Guide to Mexico,’ (1893); ‘Catalogue of the Collections of the National Museum of Mexico,’ (1884), and seven catalogues of Mexican books.

Bustillos, Jose M. (1866– —). Bustillos has set for himself the task of making popular a national poetry. He has sung the glories of the “Mexican race.” Mexican is here used in the sense of the ancient Aztec and other peoples who were found here on the coming of the Spaniards. Although he has fallen somewhat short of his aim, his poetry has in it an earnestness of purpose which merits for it the attention of every student of the literature of Mexico. It is in ‘The Rocks of the Lake’ that he has best carried out his ambitious plans.

Butler, Rev. John W., D.D. (1851– —), author of ‘Sketches of Mexico in Prehistoric, Primitive, Colonial and Modern Times’ (New York 1894). Has resided in Mexico over 30 years, during all of which time he has been pastor of the leading Methodist church of the republic.

Calderon, Fernando (1809–1845), in his short life, became for Mexico what his famous namesake is for Spain. To him is the glory of having created a national drama for Mexico. Of all the old plays of the country his are still the most popular, and they contain more material of a dramatic nature than those of any other native writer, though they are not all upon native subjects, as are the plays of some of the modern native writers. He was wonderfully prolific and his works include a long list among which the following are all well known: 'Reinaldo and Elina,' 'Zadig-Zeila, or the Indian Slave-woman,' 'Armandina,' 'Politics of the Day,' 'Ramiro, Count of Lucena,' 'Infigenia,' 'Hersilia and Virginia,' 'None of the Three,' 'The Tournament,' 'Anne Boleyn,' 'Herman, or the Return of the Crusader.' Calderon is the pride of the Mexican stage, and is considered the great light of Mexican literature. This is all true, but there are other writers who have done as much or more for the Mexican drama; for, while Calderon has been a very prolific and clever writer, yet he has gone abroad for so many of his subjects that he might have as well been Spanish French, English, German or any other nationality so far as the complexion of his drama is concerned. In contradistinction to this many of the writers of the latter half of the 19th century bent all their efforts to create a really national drama; and, with this end in view, picked their subjects and characters from Mexico and Mexican life.

Carpio, Manuel (1791–1860), is noted as a poet of wide range of sympathies and lyrical fervor. In the domain of descriptive poetry he has no superior in Mexico; but he has successfully entered all the domains of profane and religious poetry; and he was the first in Mexico to successfully handle the true epic. One critic of note has said of Carpio: "His compositions are a true gallery of exact and well-painted pictures, painted by the hand of sympathetic imagination, and that depth of feeling which makes man draw to man; and we return to them again and again and ever find pleasure in them."

Casasus, Joaquin (1858– —), is the best known writer in Mexico on political economy and civics and kindred subjects. Among his published works are: 'The Banking Question,' 'History of the London Debt,' 'The Monetary Question,' 'International Exchanges,' and 'A History of the Gold and Silver Question.' Mr. Casasus has held many important commissions from the Mexican government, and at present is Mexican ambassador at Washington. To him is due, in a great measure, the extension of the banking system in Mexico. But he is more than a writer on political science, for he has done some good literary work; and as a translator has few superiors in the Spanish language. His translations of Horace's 'Odes' and 'Evangeline' into Spanish are faithful, rythmical and poetical.

Chavero, Alfredo (1841– —). As a historian and authority upon the antiquities of Mexico, Alfredo Chavero easily stands first. He began his career as a lawyer and made politics a study to such good effect that the year he attained his majority he was elected a member of congress. Since that day he has been constantly in politics. Chavero is also a dramatist of fine talent, and his plays have been repeatedly produced upon the Spanish stage; and for a time he was a very popular dramatist in Madrid. He was one of the prime movers in the publication of the monumental work 'Mexico throughout the Centuries,' of the first volume of which he himself is the author. Among his well known plays are: 'The Loves of Alarcon,' 'Quetzalcoatl,' and 'Xochitl.' Among Chavero's archæological works of note are 'Mexican Antiquities,' profusely illustrated, 'The Astronomical Gods of the Ancient Mexicans,' 'Hieroglyphical Paintings,' 'The Wheel of Years,' 'A History of Mexico,' in five volumes. In addition to these he has published several critical and literary biographies, among which the most important are those of Boturini, Sahagun, Siguenza, Itzcoatl and Montezuma.

Contreras, Jose Peon y (1843– —). Jose Peon y Contreras has led a most active life. As a medical doctor he has occupied important posts under the Mexican government, which required heavy work; yet he has done more and better literary work than many other men who have devoted all their efforts to literature, and who have brought talents to their work. As a dramatist Contreras stands easily in the very first rank in Mexico; and as a lyric poet he has no superior in his own country. 'Unto Heaven' (1876), a drama which at once made him famous, was rapidly followed by many others, several of which were successfully produced in Madrid, where the author was a favorite. Contreras has also published many poems and two novels, all of which are popular with the Mexican people, and most of which have already obtained a continental reputation.

Cruz, Sor Juana Ines de la (1651–1694). Sor Juana Inés de la Cruz is the most inspired woman writer that Mexico has produced, and her name has become a household word throughout the country. Societies, streets, and clubs have been named after her, literary meetings without number have been held in her honor, and Mexico has placed her upon the highest pinacle of literary honor. At the age of 17 she became a nun; and, even before that she had attained fame in the literary world of Mexico. Few writers have equalled her in their knowledge of the human heart and all its moods and passions. She has been lovingly called, by the Mexican people, the tenth muse. In addition to being the most renowned poet of her day, she was looked upon as a marvel of learning, her knowledge extending into almost all branches of human knowledge.

Cubas, Antonio Garcia (1832– —), is a member of the geological societies of Lisbon, Madrid, Paris and Rome, and of practically all the scientific societies of Mexico. In addition to this, he has been active in the promotion of education in the republic. He holds the cross of the Legion of Honor, Garcia Cubas has had numerous important government appointments. In 1853 he published the first good general map of the Republic of Mexico. In 1857 he issued his first atlas; since which time he has been continuously publising improved maps, plans and atlases of the Republic of Mexico. He has also done considerable literary work.

Cuellar, Jose T. de (1823– —), who began his literary career in 1848, has written a number of very successful comedies and has been the editor of several important publications in the capital of the republic. His best known comedies are: 'The Art of Love,' 'Old Man Chacon,' and 'Poor Boys.' Of his serious dramas 'Griefs and Sacrifices,' and 'Natural y Figura' are among his best. The latter was one of the most pronounced successes that have ever appeared upon the Mexican stage. Cuellar has also written a number of successful novels, 'Salad and Chickens,' the 'Magic Lantern,' series of stories. 'The Story of Chuchu,' 'Gobina, the Ex-Figurante,' 'The Old Maids,' 'The People Who Are Just So,' 'Gabriel the Locksmith, or My Father's Daughters,' etc.

Esteva, Jose Maria (1818– —), is the only writer of note who has, with the exception of Guillermo Prieto, painted truthfully and vividly the customs, thoughts and feelings of the people of Mexico. He is inclined to be humorous and to see the amusing side of life. This gives his poetry a turn which has made it popular with the masses, yet it is doubtful if they understand the depth of meaning which lies in the apparent light thought of the author.

Guerrero, Julio (1862– —). Among the modern thinkers in Mexico there is one name worthy of special mention, that of Julio Guerrero, the author of 'Genesis of Crime in Mexico.' This book is much more extensive than its title would indicate, and the author has shown an insight into the character of his people which is rare in any nation. The book is an analysis of Mexican customs, conditions, society, character and the influences which have made and tend to change them. For the student of Mexican character there is no other work so worthy of attention.

Grenadas, Enrique Fernandez (1866– —), is par excellence the modern Mexican advocate of correct style in poetry and prose. He is the most careful writer the republic has produced. He is artistic in all he does, and his published works are models of elegance and good taste. In addition to excellent translations from Italian, he has published two volumes of original poems, entitled: 'Myrtles,' and 'Daisies.'

Gorstiza, Manuel Eduardo de (1789–1851). has the honor of having led the way in the production of native drama in Mexico. His plays are skilfully arranged, the plots good and the subjects interesting. Even to-day, after almost a century, some of his works hold the native stage. The works of this writer are noted for their breadth of view and the knowledge they display of human nature; while their style is popular enough to be well understood by the masses of the people, yet there is behind this popularity a depth of analysis and thought, a taking philosophy which make them valuable to the student of literature.

Galvan, Ignacio Rodriguez (1816–1842), a romantic, lyric and dramatic poet of great power and literary excellence, who, in his very short life, poured out a ceaseless stream of literary compositions which promised great things for the future; but in the days of his promise, he died, leaving us an earnest of what he might have done. His best known dramas are 'Muñoz,' and 'Private Secretary to the Viceroy.' His writings are characterized by a strain of melancholy, yet there is strength about his work that is noteworthy.

Icazbalceta, Joaquin Garcia (1825–1894), stands in the rank of foremost Mexican writers. For a time he traveled throughout the United States with his parents, who had to leave their country on account of political troubles. Afterwards they went to Spain, where they remained until young Icazbalceta was 11 years of age. It was after their return to Mexico City that the boy met Lucas Alaman, the great historian, who took a decided interest in him, and seeing that he had uncommon talent, encouraged him to enter literary life, which he finally decided to do in 1846. Some of his most important works are 'Ecclesiastical History of the Indians,' 'Mexico in 1554,' 'Spiritual and Sacramental Colloquies and Sacred Poems,' 'Mexican Biography of the Sixteenth Century,' 'Friar Juan de Zumarraga, First Archbishop of Mexico,' 'Dictionary of Mexican Provincialisms,' 'The Physicians of Mexico in the Sixteenth Century.' In addition to the publication of original literary matter Icazbalceta did much for literature, and history, in bringing to light many valuable writings, which he published under the titles of 'A Collection of Documents for the History of Mexico,' and 'A New Collection of Documents for the History of Mexico.'

Icaza, Francisco F. de (1863– —), is, next to Juan de Dios Peza, the Mexican poet who has received most welcome in Spain. This is probably because his writings are of that class which appeal most to the Spanish people. He is classical and correct in his diction; but his imagination is not great, and he lacks the freshness of the distinctively Mexican writers in thought, imagery and style. To him the beauties of the new world have not the charm that they have for Peza, Rosas, Flores, Contreras and Macco.

Landazuri, Isabel Prieto de (1833–1876), is the most noted woman dramatist of Mexico. She was very greatly admired as a writer by the famous Spanish dramatist, Hartzembusch, who considered her one of the cleverest dramatists of her day. In addition to this she was a lyric poet of note. Her dramas would fill a long list, but the most important are the following: 'Two Flowers,' 'Both are the Worst,' 'Tinsel and Gold,' 'Abnegation,' 'The School of Sisters-in-law,' 'A Lily among Thorns,' 'The Angel of the Hearth,' 'Penitence and Sin,' 'Carnival Night,' 'Fairy and Seraphim,' 'A Woman's Heart,' 'The Thorns of Sin,' and 'A Type of the Day.'

Lizardi, Jose Joaquin Fernandez de (1771–1817). During his short life he attained fame as a writer and thinker and became known as "El Pensador Mexicano," the Mexican Thinker. His most noted book, which has been published and republished many times and is now considered a classic in the Spanish language is 'El Periquillo Sarmiento,' one of the most thoughtful, humorous and truthful books published in Spanish. In it he analyzes every side of the human character and presents charming pictures of the various people he came across during his life. Others of his works are 'Sad Nights,' and 'Fables.'

Mateos, Juan A. (1861– —), has great talent, strong imagination and extraordinary facility in writing. He was the first of the young writers of a generation ago to break away from the pernicious habit of Mexican literary men of imitating French and Spanish writers. Both as a novelist and a dramatist Mateos has always endeavored to make use of the material of his own country; and he has met with more than ordinary success, and the public has received with unstinted applause his efforts to create a national drama. But most of the actors in Mexico are Spanish, and they have made a determined war against the innovations of Mateos, Chavero, and Peon Contreras, advocates of a Mexican national drama, and they have almost succeeded in driving from the stage the works of these older dramatists, which is to be regretted, for the works of Mateos, Chavero, Paz and Contreras are certainly superior to the Spanish comedies that now hold the boards on the Mexican stage. The government recognizes this and is now doing all it can to encourage the native dramatists and actors. Mateo's most successful dramatic work is a play called 'The Other One.'

Miron, Salvador Diaz (1853– —), as an orator and poet has many admirers in Mexico. He has a fervid imagination, and his lyrical compositions are among the best written in the republic. He has a deep sense of the beauty of rhythm and imagery, and is, therefore, more a poet for poets than for the masses.

Morales, Meliseo (1838– —), has an international reputation as a writer of lyrical drama, and his productions are quite popular on the continent, especially in Spain and Italy. In the latter country all his operatic productions and other music are printed and have much popularity. He has the honor of being the author of the first opera written in the new and presented with success in the old world. Among his best known operas are 'Romeo and Juliet,' and 'Ildegonda.' Morales was the master spirit behind the establishment of the National Conservatory of Music in Mexico City, which has done much for musical education in Mexico. In memory of his labors in the cause of higher music, various musical societies have been named after him.

Nagara, Manuel Gutierrez (1850–1895), known under his nom de plume as the "Duke Job," was noted as a painter, a sculptor, a journalist, and a poet. He paints his poems as an artist would paint a picture. He is one of the most facile writers in the long range of Mexican literary men. He changes from one subject to another without apparent effort and his style insensibly changes itself to suit the subject he has to handle. By Mexican critics he is classed among the six greatest literary men of Mexico in the 19th century.

Oca, Ignacio Montes de (1840– —), bishop of San Luis Potosi, has had a most varied career. At the age of 12 he was sent to school in England, where he remained four years. Then he went to Rome to finish his theological education. He served as parish priest in Ipswich, England, was chaplain to Maximilian, and later secret chancellor to Pope Pious IX. Montes de Oca, who writes under the nom de plume of "Ipandro Acaico," is a poet of international reputation and a prose writer of ability. Three books of poems of this author have been published in both Mexico and Madrid, namely: 'Poetic Loiterings,' 'Pindar's Odes,' and 'Greek Bucolic Poets.' His prose works comprise six large volumes of sermons, orations and pastoral subjects.

Obregon, Luis Gonzalez (1865– —), may be termed the antiquarian historian of Mexico. His methods of work are different from those of most other historians. He loves to take some incident, character or period in history and elaborate it, filling in all the details and making a most complete picture in which the figures in the foreground stand out in full relief. His works have been published in Mexico, Spain and France. Of these his best known literary effort is 'Old Mexico,' which is a series of vivid pen pictures of old Mexican customs, characters and incidents. At present Mr. Obregon is the editor of the publications of the National Museum.

Ortiz, Luis G. (1835–1894), was the author of two large volumes of poems and several novels. His style is smooth and lyrical. By his admirers he has been compared to Petarch, and, in fact, he was a great student of the Italian poets whom he imitated to a considerable extent in his younger days.

Othon, Manuel Jose (1858–), is a dramatist of note and a lyric poet. Among his dramas, a number of which have been most successfully produced, are: 'A Wounded Heart,' 'A Chain of Flowers,' 'The Shadow on the Hearth,' 'After Death,' 'What is There Behind Happiness,' 'Macbeth,' and 'Victory.' Good plots, plenty of action, breadth of view and imagination distinguish the work of Othón in the dramatic line and have gained for him a welcome among lovers of the drama.

Palacio, Vicente Riva (1832–). There was heroic blood in his veins; for his father was the patriot leader, Mariano Riva Palacio, and his mother, Dolores Guerrero, daughter of the great liberal leader and the hero of Mexican independence, Vicente Guerrero. Riva Palacio held many important political offices, all of which he administered with talent and energy; and he fought through the war of the reform, in which he distinguished himself as a military leader. Riva Palacio's literary life has been as active and even more successful than his military and civic life. He has published dramas, novels, comedies, stories, odes, poems, legends, all in correct and diversified style, which has made him one of the most popular and, at the same time, trenchant writers that Mexico has produced. As a literary critic Riva Palacio is undoubtedly the best Mexico has produced. He has a keen appreciation of the literary value of a book, poem or play, and a most entertaining and vivid style, which make his criticisms as entertaining as a more popular article from a less gifted writer. As an indication of the esteem in which Riva Palacio was held, it is only necessary to mention the fact that he was an honorary member of some thirty literary and scientific societies in Mexico, Central and South America, and Europe.

Payno, Manuel (1822–). He has held many important military and civic offices and was secretary of the treasury under two administrations. As finance minister he reduced the debt of the republic to twenty millions. Payno has been imprisoned for his political opinions and was, on more than one occasion, in danger of losing his life. Later on he was appointed Mexican consul-general to Spain. Payno is noted for the fervency and clearness of his literary style. Some of his descriptions are prose poems in which his vivid imagination creates wonderfully realistic pictures. Notwithstanding the heavy burdens of his public offices, he has written more and better than many men who have devoted all the energies of their lives to literary pursuits. He has produced history, biography, political treaties and several excellent novels. The work for which he is best known is 'The Devil's Scarf Pin.' But the book which will have most interest to foreigners is 'The War Between Mexico and the United States.' Many literary honors have come to Payno both from Mexico and from foreign countries.

Paz, Ireneo. The extraordinary life of Ireneo Paz reads like a romance. He worked his way through the university; he fought in the war of reform, and in that of the French intervention and, at the same time, he wrote energetically for the press, denouncing the French in no measured terms; and his work did a great deal to strengthen the resistence of the Mexican people against the French invaders. When General Diaz rose in arms Ireneo Paz was at his side. In a most interesting book, 'Some Campaigns,' he has given an account of the many adventures of himself and his companions during these unsettled times. After the war Ireneo Paz soon became noted as a journalist, poet, novelist, dramatist and short story writer. Several of his comedies were very popular. One of these, the 'Apple of Discord,' is very bright from beginning to end and it is still a favorite on the Mexican stage. Mr. Paz is editor and owner of 'La Patria,' one of the best known dailies of the capital.

Pesado, Jose Joaquin (1801–1861), is the classical poet of Mexico. He is noted for the purity of his style, his choice of language and the wonderful exactness of his literary pictures. In his day he was on intimate terms with the greatest of Spanish poets, who looked upon him as a worthy brother in literature. The famous poets Zorilla, Martinez de la Rosa, and Herreras were unstinted in their praise of the "new star in the horizon of Mexican literature."

Peza, Juan de Dios (1852–), is the best known of all the living Mexican poets. He was graduated in medicine, but drifted into journalism, and soon became known as one of the most clever newspaper men in the republic and as a poet whose writings appealed to the mass of the people. In rapid succession he published three dramas, which are widely read: 'The True Home,' 'The Last Days of Christopher Columbus,' and 'A Love Affair.' In 1876 he awoke one day to find himself famous; and since the death of Guillermo Prieto, a few years ago, he has been the literary leader in the capital. As a result of his literary fame he was sent to Spain as secretary of the Mexican legation. His fame as a poet and dramatist has been steadily growing; and most of his best work has been translated in different European languages; and in Mexico there have been more and better editions of his works published than of those of any other living author. Editions of his works have also been published in Madrid, Paris, and Philadelphia. Peza is also a master of prose and one of the first orators of Mexico. A few of his most popular works are: 'Songs of the Hearthstone,' 'Home and Country,' 'The Arrow of Love,' 'Memories and Hopes,' 'Flowers of the Soul,' 'Legends of the Streets of Mexico,' 'The Harp of Our Native Land,' 'The Mexican Lyre,' 'Mexican Traditions,' and 'Monologues of Songs and Heroes.'

Prieto, Guillermo (1818–18—), is the master poet of Mexico. He has better sounded the depths of the human heart; he has painted better the Mexican character, and appealed more to the masses than any other native writer. As a poet, Prieto has cultivated the ode and the romance. His mastery of the former has revealed him as a great poet; his success in the latter has made him the most popular poet of Mexico, not even excepting Juan De Dios Peza. Prieto is the only Mexican poet who has successfully painted the customs of the Mexican people of all classes and the traditions of Mexican history in a popular manner. He was the first to form traditions of glory for a people which had been occupied in struggling and quarrelling within itself. He called the people out of its darkness and made his cry the glory of Mexico,—Mexico united and great. This is why he has struck the deepest chord in the Mexican heart, so that, before his death, the old man was raised almost to the pinnacle of a saint by the middle and lower classes. He is a satirical and romantic poet, and his chief work is 'El Romancero Nacional.' During his long life Prieto was continually associated with the political events of the history of his times, and he was more than once in exile for his political opinions.

Rivera, Agustin (1824–), studied law and theology, and was graduated both as a priest and as a lawyer. On account of these qualifications he became the attorney for the Ecclesiastical Curia. He has published in the neighborhood of a hundred books and pamphlets, among the best known of which are his 'History of Ancient Mexico,' 'Critical Observations upon the Vice-Royalty of New Spain,' 'Principles of Criticism,' 'The Philosophy of New Spain.' But his writing cover a very wide literary field; and he has come to be looked upon as the most fearless, and, at the same time, judicious and clear-headed writer in Mexico. In 1901 the national government passed a bill granting him a pension in recognition of his constant labors in the cause of literature, culture, and truth. Many of his works have been published in Spain, and they are read in all Spanish-speaking countries.

Ruiz, Eduardo (1832–), is a charming story teller. In addition to a work on constitutional law, which has become a text-book, he has written 'A History of the War of Intervention in Michoacan,' 'Landscapes,' 'Traditions and Legends,' and 'Legends of Michoacan.' In these he handles, with a most sympathetic touch and clear insight, the stories of the people.

Sierra, Justo (1848–). Of all the literary men in Mexico, Justo Sierra exemplifies best the general tendency of Mexican literature. The whole temperament of the man would lead him to adopt a literary life, yet his surroundings have made of him a politician, a public speaker and an educator. His father was one of the most distinguished literary men of Yucatan; and young Sierra early showed a decided literary bent. He graduated in law and at the age of 24 was chief secretary to the supreme court of the nation. Since then he has been in succession, a member of Congress, magistrate of the supreme court, and minister to Madrid. He is now minister of education for the Republic of Mexico. Justo has the reputation of being the best orator in Mexico; and is widely known as a poet, novelist, and historian. His 'General History' and 'History of Mexico' are both standard works.

Solis, Juan F. Molina (1850–), lawyer, professor, journalist, and author; is one of the most vivid and thorough historians whom Mexico has produced. His 'History of the Discovery and Conquest of Yucatan,' and 'Summary of the Ancient History of the Peninsula,' have an international reputation. He has written much on political subjects, and always with conservatism, lucidity, and earnestness.

Southworth, John R., F.R.G.S., well-known author of 'The Mines of Mexico,' the (Bankers' Official Directory of Mexico); 'The Haciendas of Mexico,' and seven large, illustrated volumes, descriptive and statistical, on the Mexican states of Yucatan, Vera Cruz, Puebla, Oaxaca, Sonora, Sinaloa, Lower California, and the Federal District.

Tablado, Jose Juan (1871–), is perhaps the most discussed of the younger poets in Mexico on account of his defiance of most of the tenets of the poetical schools of the day. He is oriental in his tastes, his coloring and his pictures; but, at the same time, he is original, imaginative, and lyrical.

Talbot, Elisha Hollingsworth (1839– —), founder and many years editor of the 'Railway Age,' Chicago and New York; a life long member of the American press, author of 'Commercial and Industrial Mexico at the Close of 1906,' and for 20 years past writer on various Mexican topics.

Urbina, Luis G. (1868–), is the youngest advocate of the romantic school of poetry in Mexico, and, as such, is looked upon by the older writers as the most promising young poet of the republic. His imagination is vivid, his style fluent and graceful, and he looks at life from the view of a man who sees far and clearly. He ought to produce better things than the already excellent work he has done.

Vigil, Jose Maria (1829–), librarian of the National Library of Mexico, has had a most varied career, during part of which he edited, in San Francisco, 'The New World,' a reform newspaper. He is one of the oldest living literary men of Mexico, and it is now over 50 years since he first entered political life, during all of which time he has never taken off the harness. Yet, notwithstanding this, he has been one of the most prolific writers this country has produced. One of his dramas, 'Dolores,' has been repeatedly upon the boards, and, for a time, was quite popular. In 'Flowers from Anahuac,' Mr. Vigil has published dramas and poems which are placed in the front rank by Mexican critics. In addition to this he wrote the fifth volume of 'Mexico Throughout the Centuries.' This volume treats of the reform period in Mexico. Mr. Vigil has influenced political thought probably more than any other writer in Mexico. He has also been an educator of note and was professor of logic in the semi-university —"The National Preparatory School of Mexico." He is a member of all the important scientific and literary societies of Mexico and also of a number on the continent of Europe.

Zaragoza, Antonio (1855–), belongs to the same school as Juan de Dios Peza, Flores and Acuña. His work is characterized by fervid imagination, and that lyrical, mystical, poetic quality which distinguished Acuña, above his fellow poets. On the publication of his first volume of poems Zaragoza at once became famous, and has ever since held his place as one of the foremost poets that Mexico has produced. He has published several volumes of poems, all of the same class.

John H. Cornyn,
Director Mexico City Grammar and High School.

8. Mexico — Agriculture. Until recent years agriculture in Mexico, except as engaged in by a comparatively few,— the owners of vast

haciendas or estates,— and by these in a most imperfect way, was sadly neglected. Mining occupied the centre of the stage to the practical exclusion of all other great interests. But this was not the only obstacle; the difficulty of obtaining land except in large tracts, the indisposition of the owners of the great haciendas to dispose of all or even a part of their vast holdings; the fact that land not under cultivation is not taxed; the prejudice of the native working farmers against adopting modern methods; the lack of satisfactory means of transportation; the almost entire absence of immigration from the agricultural communities of other countries, and various other causes had contributed to the practically universal lack of interest in farming as a business. Now, however, the country is awakening to the fact that agriculture is quite as important as mining, in the great work of material development; and modern machinery and methods are rapidly driving the wooden plow and its companion implements of past ages into deserved obscurity. In fact, the industrial statistics of the republic indicate a growth of this industry in the last few years quite as remarkable and as promising for the future as has been the growth of mining. In every section penetrated by the railway and the spirit of progress, the old is giving way to the new, and results are amply proving that Mexico will in time occupy quite as prominent a place among the agricultural countries of the world as among those noted for their mineral wealth.

Agricultural Products.— In 1903 the principal agricultural products were:

Rice	$2,928,693
Corn	82,162,962
Coffee	11,440,515
Vanilla beans	758,633
Cotton	7,911,625
Sugar	15,742,325
Brandy from cane	10,933,742
Brandy from grapes	115,941
Brandy from corn	635,516
Indigo	176,032
Chili peppers, dried	2,296,888
Chili peppers, green	3,810,298
Garbanzos, peas for hogs	1,469,302
Ixtle	2,953,213
Mezcal, liquor from the Maguey plant	1,324,954
Barley	6,641,181
Wheat	19,235,784
Tobacco	4,541,581
Henequen	41,087,852
Chick peas	2,377,075
Cacao	1,388,634
Tequila, brandy from the Maguey plant	2,139,370
Wine from grapes	184,300
Peanuts	633,744
Sweet potatoes	646,051
Frijoles, table beans	10,175,930
Habas, another variety of bean	2,590,257
Lentels	110,567
Molasses	6,477,374
Irish potatoes	713,236
Rye	166,577
Oats	24,898
Common pulque	3,531,539
Superior pulque	9,489,374
Syrup from cane	2,219,014

The total value of the 57 varieties of fruits produced in the republic in 1903 was $6,700,000, and of the 30 varieties of vegetables, $1,588,000. There were 8,083 haciendas or large farms, 34,958 ranches or small farms and 109,378 unclassified. There were employed on these farms of all classes, 1,425,135 laborers, of whom 1,358,165 were males and 66,970 were females. Number of hectaras of land under cultivation and not irrigated, 10,605,887; irrigated, 1,550,980; in pasture 48,762,849; timber land 17,786,715. It is estimated that in 1900 there were in the entire republic, 479 square leagues of thick forests, 18,134 square leagues of ordinary wooded land, and 40,833 leagues of uncultivated land. The area especially suited for the cultivation of wheat is estimated at 52,000 square miles, and includes the States of Michoacan, Mexico, Chihuahua, Puebla, Jalisco, Guanajuato, Aguascalientes, San Luis Potosi, Coahuila, Queretaro and Zacatecas. In these States three crops can be successfully grown in two years, averaging 20 bushels to the acre each. With the aid of irrigation, not only this grain but all others can be successfully grown in very nearly all parts of the republic.

From 1897 to 1901, inclusive, the total production of corn in Mexico was 472,549,643 bushels, valued at $431,908,840. In the last year named, the highest price realized ($3.18 per bushel) was reported from the State of Tamaulipas, and the lowest (53c. per bushel) from the Territory of Tepic. The higher figure named was due to a corner and the lower chiefly to a lack of proper transportation. The leading corn States in 1903, as per official reports, were: Jalisco, $8,770,076; San Luis Potosi, $7,843,751; Guanajuato, $7,650,807; Veracruz, $6,942,562; Puebla, $5,315,948; Mexico, $4,844,803; Guerrero, $4,359,823; Michoacan, $4,325,706; Durango, $3,343,226; Hidalgo, $3,037,027; Queretaro, $2,951,388; Zacatecas, $2,917,267.

The leading wheat states were: Guanajuato, $3,634,749; Michoacan, $3,617,792; Puebla, $3,095,199; Coahuila, $1,803,870; Queretaro, $1,052,460; Mexico, $1,385,122; Chihuahua, $1,039,482; Tlaxcala, $1,027,775.

The leading tobacco states were: Veracruz, $2,142,005; Oaxaca, $759,284; Hidalgo, $408,761; Chiapas, $383,990. *Vanilla:* Puebla, $428,833; Veracruz, $328,400. *Fine pulque:* Tlaxcala, $3,524,550; Hidalgo, $3,025,382; Mexico, $2,504,766. *Henequen:* Yucatan, $29,563,524; Campeche, $11,481,597, *Haba beans:* Michoacan, $1,219,742; Mexico, $1,005,206. *Frijoles:* Veracruz, $1,290,574; Puebla, $1,263,978; Jalisco, $996,337. *Sugar cane:* Veracruz, $5,369,577 Morelos, $1,239,184; Puebla, $945,895. *Barley:* Mexico, $2,648,934; Puebla, $1,423,709; Hidalgo, $827,628. *Coffee:* Veracruz, $7,825,387; Chiapas, $1,698,797; Oaxaca, $542,762; *Cacao:* Tabasco, $751,866; Chiapas, $610,897. *Sugar:* Morelos, $6,432,597; Veracruz, $3,104,269; Michoacan, $1,363,099; Puebla, $1,174,940; Jalisco, $966,825. *Rice:* Morelos, $934,568; Michoacan, $560,613; Puebla, $457,462; Veracruz, $370,111. *Cotton:* Coahuila, $5,260,332; Durango, $1,772,864. *Brandy from sugar cane:* Jalisco, $3,503,847, Veracruz, $2,900,120; Morelos, $1,123,826; Puebla, $684,128.

Live Stock.— The live stock industry has experienced important growth in the past few years, present indications leaving no doubt that it is destined to become, in the near future, one of the most profitable in the republic. As far back as 1883, there "roamed over an area of 300,000 square miles in the northern part of the country," according to a well known writer, «1,500,000 cattle, 2,500,000 goats, 1,000,000 sheep, 1,000,000 horses and 500,000 mules, and there were 20,574 cattle ranches in the republic, valued at $515,000,000.» Between the cities of Jalapa and Veracruz, and between Veracruz and Cordoba, great numbers of cattle are to be seen from passing railway trains, their sleek and well rounded sides testifying to the excellence of the grasses which are indigenous to the soil of that favored section of the republic. And this is only an illustration of similar scenes in other sections of the same state, and for that matter in most parts of the country.

The Great Estates.— The principal agricultural need of Mexico, and which may be considered an offset to the wonderful natural advantages of soil and climate, is the division and subdivision of the great estates which, from the picturesque point of view, have long been and unfortunately still continue to be one of the country's most interesting characteristics. It is not possible for any country, however favored by nature, to even approximately reach its agricultural possibilities so long as its most productive lands are held in enormous tracts by a few wealthy «hacendados» who only cultivate an infinitesimal part of their holdings and have neither need nor ambition to make each acre produce close up to the limit of its capability. The «farms» of Mexico, under existing conditions are really princely estates, frequently numbering their acres far up into the hundreds of thousands, while not producing a tenth part of the returns possible under the system prevailing in agricultural communities which have really become rich and have added their proper quota to the wealth of the world. Their owners are loth to dispose of any part of their holdings, which in most cases, have descended from father to son through a long line, and have come to be regarded as inseparable from the family name or proprietorship. Herein is found one of the chief reasons why so few practical farmers of moderate means emigrate to Mexico. They are neither able nor disposed to buy a great «hacienda,» and it is not possible for them to secure desirable land in small quantities and favorable localities under existing conditions, except by combining as a colony, purchasing a large tract and dividing it into farms suited to individual requirements.

Public Lands.— There are still government or public lands to be had, but most of these are somewhat removed from the advantages of railway communication, a favorable market and social and educational privileges. Some 25,000,000 acres of public lands yet remain to be disposed of, the prices of which are annually fixed by the government. For the fiscal year 1905–06 these were as follows, by states and territories, per hectara (2.471 acres):

Aguascalientes	$2	25
Campeche	1	80
Coahuila	1	00
Colima	2	25
Chiapas	2	00
Chihuahua	1	00
Durango	1	00
Guanajuato	3	35
Guerrero	1	10
Hidalgo	2	25
Jalisco	2	25
Mexico	3	35
Michoacan	2	25
Morelos	4	50
Nuevo Leon	$1	00
Oaxaca	1	10
Puebla	3	35
Queretaro	3	35
San Luis Potosi	2	25
Sinaloa	1	10
Sonora	1	00
Tabasco	2	50
Tamaulipas	1	00
Tlaxcala	2	25
Veracruz	2	75
Yucatan	1	80
Zacatecas	2	25
Federal District	5	60
Territory of Tepic	2	00
Territory of Lower California		65

Until the close of the War of Independence these lands were held by the Spanish Crown or the Catholic Church.

Country Property.— In the year 1903 the government reported the value of rustic or country property in the several states and territories, as follows:

Aguascalientes	$3,610,961	77
Campeche	2,455,064	31
Coahuila	9,719,942	00
Colima	2,486,532	00
Chiapas	23,772,129	00
Chihuahua	6,982,031	00
Durango	15,925,915	00
Guanajuato	33,534,025	06
Guerrero	5,211,575	00
Hidalgo	18,713,773	76
Jalisco	52,138,778	00
Mexico	32,782,127	00
Michoacan	25,599,481	00
Morelos	7,314,023	34
Nuevo Leon	7,670,564	43
Oaxaca	17,200,479	98
Puebla	35,583,806	56
Queretaro	11,997,329	00
San Luis Potosi	17,500,000	00
Sinaloa	5,595,000	00
Sonora	5,743,457	85
Tabasco	8,168,735	16
Tamaulipas	8,413,076	00
Tlaxcala	8,113,497	94
Veracruz	60,960,695	92
Yucatan	15,141,668	66
Zacatecas	16,339,094	66
Territory of Tepic	3,960,515	28
Lower California	3,723,702	25
Federal District	37,400,658	40

It is probably safe to mark this total valuation of country property ($503,258,640.33) up to $600,000,000, if not, indeed, to $700,000,000 at the end of 1906, as the three years that have passed since the foregoing table was prepared have witnessed greater advance in real estate value throughout the republic than have any preceeding six years.

Surveying the Land.— It is remarkable, under the circumstances of prolonged Spanish control and succeeding revolutions and rapid changes of government, that in Mexico land titles are probably as nearly invulnerable as in any other part of the world. When this country came into her own she soon realized that she had indeed inherited a wealth of uncertainties and an embarrassment of riches. Spain had regarded herself as the owner of all the land and had by virtue of this assumption granted it in princely tracts to favorites, regardless of the rights of others. As a means of avoiding the enormous cost of surveying, the government adopted the plan of contracting with private parties to survey it for one-third of the amount surveyed. Up to 1892 there had been surveyed under this plan, 50,631,665 hectaras, or almost 127,000,000 acres, and many

MEXICO.

RAMON CORRAL,
Vice-President and Secretary of the Interior.

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other millions have since been added to this total. At this time the work is being actively prosecuted by an American company in some of the west coast states, and will doubtless be pushed to completion as rapidly as posible.

Immigration.—As far back as 1827 Mexico began to encourage immigration, but no practical or really serious efforts in this direction were made until 1882. The present colonization law was enacted in 1885. But, for the reasons herein-before given, the effort has not thus far been nearly as successful as climatic, soil and other natural advantages justified.

Chief Industries.—A brief reference to the chief features of the agricultural industry of the country will prove instructive and interesting.

Sugar.—Although not enough sugar is yet produced for home consumption the industry is growing quite rapidly and will soon contribute materially to the volume of the country's exports. The greater part of the cane is grown at altitudes above 2,000 feet, but the best results are obtained in the lower country, where it matures sooner, and where it may be cut twice annually without necessitating replanting more than once in upwards of ten years. In the Cuernavaca valley, state of Morelos, the first sugar estates were cultivated by negro slaves, bought at Veracruz, at from $300 to $400 each. But the experiment proved unsatisfactory, and free labor was soon substituted. Now the plantations are worked chiefly by Mexican labor, the mills are supplied with modern machinery, and the quality of the product is rapidly advancing to the front rank in quality.

Tobacco.—This industry is also developing great possibilities. The climatic and soil conditions, especially in the tropics, are very favorable to the best results, and whereas in Cuba the soil, after 400 years of constant use has become comparatively unproductive, in Mexico no artificial stimulant is needed, and the flavor and aroma of the tobacco are conceded to be superior to those of the Cuban product. The chief tobacco states are Veracruz, Oaxaca, Hidalgo and Chiapas.

India Rubber.—While there has been much unsatisfactory experimentation with the rubber tree, the failures have generally been chargeable to lack of knowledge or experience or to the introduction of illegitimate speculation at the expense of practical results. As an illustration of the possibilities of proper methods, reference is made to a well known rubber plantation in the state of Oaxaca, consisting of 200,000 trees now 16 years old, which yielded a first crop valued at $120,000, and, according to a distinguished Mexican authority, "the net profit on the investment, after deducting entire cost of the land and all expenses up to the first year of harvesting (five years), has been over $100,000 a year," or more than 400 per cent. Quite recently it was discovered that a plant known as the Guayule, which is indigenous to the northern states of the republic, growing wild in enormous quantities, can be profitably utilized in the manufacture of rubber, and already many factories have been established and a large amount of capital invested in the new enterprise. The Guayule rubber, however, does not yet command as high a price as the other, though it seems likely to work quite a revolution in the industry.

Agave or Maguey.—This plant, from which is extracted the drink known as pulque, a white juice having the appearance of milk, which the natives use in immense quantities, is perhaps the most important feature of the agricultural interest of the central plateau. Although pulque contains only about 7 per cent. of alcohol, it is intoxicating when drunk in large quantities. It possesses important medicinal qualities, is a tonic and very nutritive. From 350 to 700 agave or maguey plants to the acre are planted. They mature in 8 years and give milk for a period of about five months, producing from 125 to 160 gallons of pulque each. The plants cost about $2 each by the time they have matured, and give a return of from $7 to $10 each. The pulque is secured by making a cavity in the centre of the plant, from the top, large enough to hold a few quarts, and is drawn out by rude syphons once a day. The leaves of the plants sometimes grow to be 12 feet long and weigh from 25 pounds to 100 pounds each.

Banana.—This fruit is successfully grown everywhere in Mexico between sea level and an altitude of 5,000 feet. It is easily cultivated and very profitable. Frequently a return of $1,000 is realized from an outlay of $500 in a single season. A plantation of 1,000 trees, costing $500 will, under favorable conditions, earn this amount, even though, as at present, the methods used may be faulty, the care exercised insufficient, and the variety poor. Realizing the importance of material improvement in these and other details of the industry, the government has recently taken measures to bring about such a result as speedily as possible. Heretofore, these details have been generally and sadly neglected, resulting in the production of many varieties of the fruit at the expense of quality, reputation, and foreign demand, as well as of home appreciation. A favorable feature of banana growing is the fact that the ground occupied by the trees may also be utilized at the same time for the cultivation of coffee or other profitable products. Few other tropical fruits develop and become profitable as quickly as does the banana. Especially agreeable are some of the smaller varieties, although they may not be as much sought after as the larger and more pretentious ones. Their flavor possesses qualities not found in any other known variety.

Orange.—The oranges of Mexico are rapidly and surely winning favor in the markets of the north. Their true worth has only recently come to be understood and appreciated by consumers. It is not difficult to imagine the resulting increase of this popularity when the improved methods of cultivation now being introduced by expert horticulturists under direction of the government, have had time for fruition. Up to this time, neglect of pretty nearly every detail of the industry has been the rule, and even ordinary care has been the exception. Although the orange finds favorable conditions in all the tropical and sub-tropical states, the best results thus far appear to have been attained on the shores of Lake Chapala, in the state of Jalisco, and in Veracruz, Yucatan, Michoacan, Sonora, Morelos, Durango, Nuevo Leon, Oaxaca and Puebla. The leading producers in 1903 were: Jalisco, $211,600; Yucatan, $118,971; Michoacan, $92,563; Sonora, $52,283; Morelos, $51,246; Durango, $45,938; Nuevo Leon, $45,249; Oaxaca, $37,240; Puebla, $35,158; Sinaloa, $25,670, and Hidalgo, $24,938. Veracruz did not report. Although the oranges of La Barca, in the state of Jalisco, are considered the best now being produced in the republic, they must in due time find competitors worthy of recognition in the product of Michoacan, Veracruz, Morelos, and other localities equally favored by Nature and only requiring reasonable care and approved methods of cultivation. The best results are secured at elevations below 2,500 feet. The trees begin bearing when three or four years old and increase until the 12th or 15th year. Frost never occurs in any of the orange growing states.

Lemon.—It is doubtful if any product indigenous to the soil of Mexico has been as sadly neglected as the lemon. So largely has it been relegated toward the lower end of the list of tropical fruits, in favor of the lime, that it can with difficulty be obtained in the markets, and when found is generally unsatisfactory in quality. And this, notwithstanding the existing very favorable conditions of soil and climate and the increasing demand in the world's markets. According to government reports the little state of Morelos produced $60,627 worth of lemons in 1903, out of a grand total of $101,827 worth for the entire republic. But one other state (Yucatan), exceeded $10,000 worth, its product being valued at $12,200.

Limes.—This remarkably successful rival of the lemon, in Mexico, is grown chiefly in the states of Guanajuato, Puebla, Michoacan, Mexico, Jalisco, Oaxaca, Guerrero and San Luis Potosi. Twenty-two states produced $145,841 worth in 1903, according to government reports, which, however, do not include Veracruz. Of this amount Guanajuato is credited with $45,023. The lime of Mexico is of very excellent quality, but like the lemon and the orange, can be greatly improved by the adoption of proper methods of cultivation and the exercise of reasonable care.

Pineapple.—In the production of this fruit Mexico excels and is constantly advancing. The towns of Cordoba and Amatlan, in the state of Veracruz, have long been noted for the size and quality of the pineapple grown in the regions round about them. The fruit is also successfully grown in the states of Puebla, Hidalgo, Tabasco, Chiapas, Oaxaca, Morelos, Guerrero, Michoacan, Colima, and Jalisco, and the territory of Tepic. It prospers most at elevations of 2,000 to 3,000 feet. Was cultivated before the conquest. Its leaves have for centuries been utilized to a greater or less extent in the manufacture, though by crude methods, of rope, twine, thread, mats, bagging, hammocks, paper, and cloth of various colors. The value of pineapples grown in 1903 is officially given as $84,932, the chief producers named in the official reports being the territory of Tepic and the states of Hidalgo and Tabasco. Again the state of Veracruz is omitted, notwithstanding that its product doubtless excels that of the rest of the republic. The industry, when intelligently conducted is very profitable.

Other Products.—Included in the general category of agricultural products and of the numerous other articles closely allied to them, which are or can be successfully cultivated in Mexico, may be mentioned the yucca, or starch plant, which is said to contain six times as much nutritive matter as wheat, and which is grown principally in the states of Veracruz, Oaxaca, Chiapas, Tabasco and Yucatan; chicle, or chewing gum, of which over $1,000,000 worth has been exported to the United States in a single year; the mangoe, one variety of which (the Manilla) seems to combine about all the more delicate and delicious flavors of all the choice fruits of the world, but which, being very perishable, cannot be transported a great distance without suffering serious depreciation in value. The apple, peach, and pear are all grown in various parts of the republic, but neither has yet been brought up to anything like the standard of excellence reached in the United States, notwithstanding that almost all the natural conditions are exceptionally favorable.

Vegetables.—The same remark applies to vegetables as to fruits which are not properly cultivated and the varieties of which have never been improved in the slightest degree, but have deteriorated from year to year. There is absolutely no reason why practically everything grown in other countries, whether tropical, subtropical or temperate, cannot be grown in Mexico with equal or even greater success.

Stock-raising.—The plans of northern Mexico and the valleys of the southern portion offer most favorable opportunity for profitably engaging in the live stock business. The climatic and other conditions are very favorable, the grasses are most nutritious. The transportation rates and facilities are such that cattle can be raised in Mexico and shipped to the markets of the United States at a good profit. An idea of the increase of this industry in Mexico may be gained from the reports by the government of the number exported annually, and which show a regular and very considerable increase. The Para grass of the southern Mexican states is always green, grows luxuriantly and is very nourishing. It is estimated that an acre of this, if cut, will feed two head of stock the year round, and that three acres in pasture will fatten four head. Weeds will not grow with it. Because of the great number of flies and ticks in the low country, very young stock thrives better on the higher plains of Durango, Chihuahua, Michoacan, etc. Taken as a whole, Mexico has an abundance of sustenance to provide for an enormous increase of her present supply of live stock of every kind. According to the Bureau of American Republics, the states of Durango, Sonora, Chihuahua, Nuevo Leon, Coahuila, Tamaulipas, Veracruz, and Michoacan constitute "an admirable field for the carrying on of the cattle industry." That the government of Mexico earnestly desires to encourage this industry in a general way, and more especially to bring about the material improvement of the native stock of every description, from horses and cattle down the long line to turkeys and chickens, has been evidenced in many practical ways. Therefore there is every reason to anticipate for it a most prosperous and progressive future.

Cotton.—This industry is confined to the following states, which in the last year reported by the government, gave the results here stated: Coahuila, $5,260,332; Durango, $1,772,864; Veracruz, $173,715; Tamaulipas, $157,419; Guerrero, $148,145; Chihuahua, $142,680; Oaxaca, $100,612; territory of Tepic, $55,303; Sonora, $41,500; Sinaloa, $18,460; Michoacan, $16,002; Chiapas, $16,100. While the natural conditions and possibilities seem to favor the rapid development of the cotton industry in most or all of the states named, it is probable that lack of thoroughness and a disinclination to adopt the most modern methods will greatly delay the accomplishment of best results. Only about half the raw cotton required by the mills of the republic is grown within its boundaries.

Corn.—The fact that in the year 1903 Mexico produced almost $100,000,000 worth of corn leaves no doubt of its adaptability to the cultivation of this grain. Although it is the "staff of life" with the common people, but little is ground into meal, as in the United States, the mass of consumers preferring the old way of grinding for themselves what they require, on the rough surface of the ancient stone "matate," with the aid of a "rolling pin" of the same material. Neither the ears nor the grain of Mexican corn grow as large as does the corn of the United States, but the quality is excellent, all the more important elements of nutrition and flavor being present.

Wheat.—As the masses in Mexico seldom indulge in wheat bread or other articles of food composed of wheat flour, this grain does not receive the attention that is bestowed upon it in other countries. Its use is almost wholly confined to the wealthy and upper middle classes. While the quality is hardly equal to that of the recognized wheat countries, it is very good and no doubt can, through modern methods of cultivation, the exercise of proper care, and reasonable attention to the securing of varieties which are best adapted to the soil and climatic conditions, be brought up to the highest standard of merit.

Alfalfa.—This is a luxuriant grower in almost every part of the republic,—especially when cultivated by irrigation,—and is a very profitable industry. In many regions several crops can be successfully grown in a single year. In fact the prevailing conditions of soil and climate are very favorable, not only to alfalfa, but to almost all fattening grasses as well.

Rice.—This grows well in Mexico without inundation. The total production in 1903 was officially valued at $3,000,000. Of this amount $934,568 was realized by the state of Morelos, $560,613 by Michoacan, $457,462 by Puebla, $370,111 by Veracruz, $194,026 by Colima, and $109,647 by the territory of Tepic. The other rice states, in the order of amount produced, were Jalisco, Chiapas, Tabasco, Guerrero, Tamaulipas, Oaxaca, and San Luis Potosi.

Coffee.—One of the leading products of the country and very profitable when cultivated, harvested and prepared for the market, by persons of experience who are actuated by the sole desire to secure the best possible results rather than to speculate by selling partly grown plantations to ignorant purchasers for several times their actual value. The value of the product for 1903 was $11,440,515, of which Veracruz produced $7,825,387; Chiapas, $1,698,797; Oaxaca, $542,762; San Luis Potosi, $269,745; territory of Tepic, $199,225; Tabasco, $165,110, and Hidalgo, $109,979; the other coffee states bringing up the rear in the following order of production: Jalisco, Michoacan, Morelos, Guerrero, Mexico and Colima. The quality of Mexican coffee has been materially improved in recent years, and is now most highly regarded in the markets and at the firesides of the world. Many Americans are engaged in its cultivation,—especially in the state of Veracruz.

Cacao.—In Colonial days the cultivation of cacao received greater attention than is now given it. So highly prized was the product of the state of Chiapas at that time, that it is said that it was exclusively used by the royal family of Spain, by whom it was considered the best in the world. In 1903 the state of Chiapas produced cacao valued at $761,320 and Tabasco $931,596, the entire remainder, amounting to but $21,350 being divided according to amount produced, between the states of Veracruz, Michoacan, Guerrero, Oaxaca, Puebla and the territory of Tepic.

Vanilla.—The former profitableness of this industry has been greatly reduced by the extensive manufacture of an imitation and cheaper article in the United States, in recent years. Formerly the vanilla of Papantla, in the state of Veracruz, found ready sale at from $15.00 to $18.00 (Mexican money) per pound. Now it brings little more than half this amount. The total value of the Mexican vanilla crop of 1903, was only $758,633, divided between five states, as follows: Puebla, $428,833; Veracruz, $328,400; Chiapas. $600, Jalisco, $550, Guerrero, $250.

ANTONIO PEÑAFIEL,
Director of the General Bureau of Statistics.

9. Mexico — Mines and Mining. So intimately associated with the history of Mexico,—ancient and modern,—is the mining industry, that it would be impossible to exhaustively or intelligently consider either independently of the other. It cannot be doubted that centuries before the conquest of the country by Cortez, the native Indians had formed a more or less intelligent estimate of the value of the precious metals which, in a crude way, they extracted from the earth and fashioned into articles of personal adornment. This knowledge, though simple and superficial, had served, together with their natural cunning, to impress upon their untutored minds the importance of guarding from their conquerors the secret of the exact locations of the rich deposits they had discovered,—a secret which was only drawn from them through fear and cruelty. How thoroughly and profitably this information has been utilized from that time to the present in the acquisition of wealth is shown by the estimates of production of the precious metals, which have from time to time been made and published by various authorities of generally accepted reliability, a few of which are here given:

One of these gives the total production of the precious metals from 1537 to 1880, as $3,881,380,000; another, for the same period, as $4,653,-

930,000; another, for the period from 1537 to 1884, as $3,220,363,000; another, for the period from 1493 to 1895 (silver alone), as $5,000,000,000; another, for the period from 1537 to 1880, as $2,970,000,000; another estimates the entire output in 370 years as $3,847,340,000.

From this confusing variety of estimates the reader must choose for himself; or, what is safer, ascertain the average and add at least 25 per cent. to cover the probable deficiency caused by the incompleteness of totals, resulting from ignorance, carelessness, neglect, or design. In fact it is advisable to make a considerable addition to most statistical reports or estimates given out in this country, whether official or otherwise. The following figures, however, correctly represent the coinage of precious metals by the mints of Mexico from 1537 to 1896 inclusive,—a period covering 359 years:

Period.	Silver.	Gold.	Copper.	Totals.
1537 to 1731	$8,497,950	$752,067,456	$200,000	$760,765,406
1732 to 1771	19,889,014	441,629,211	....	461,518,225
1772 to 1821	40,391,447	888,563,989	342,893	929,298,329
1822 to 1873	45,598,020	758,822,054	5,235,177	809,655,251
1873 to 1896	11,561,080	557,581,690	203,296	569,346,066
Totals,	$125,937,511	$3,398,664,400	$5,981,336	$3,530,583,277

The exports of gold and silver bullion from 1888–89 to 1902–03, inclusive, were as follows:

Fiscal Years.	Gold Bullion.	Silver Bullion.	Total Gold and Silver Bullion.
1888-89	$349,506	$6,629,260	$6,978,766
1889-90	457,608	7,259,956	7,717,564
1890-91	612,618	6,751,217	7,363,835
1891-92	751,407	6,559,668	7,311,075
1892-93	357,887	5,148,202	5,506,089
1893-94	155,954	3,130,823	3,286,777
1894-95	4,139,645	18,803,867	22,943,512
1895-96	5,246,418	26,345,160	31,591,578
1896-97	5,858,366	32,137,257	37,995,623
1897-98	6,364,308	35,721,275	42,085,583
1898-99	7,347,760	40,429,054	47,776,814
1899-1900	7,225,615	52,116,284	59,341,899
1900-01	8,738,263	53,036,016	61,774,279
1901-02	9,141,294	48,021,133	57,162,427
1902-03	11,206,839	48,276,797	59,483,636
1903*	11,177,754	82,317,746	93,495,500
1904-05	13,696,146	65,523,645	79,219,791

The total silver product of the world from 1493 to 1895 is stated to have been $10,345,688,700, of which about one-half was supplied by Mexico. Accepting the records of the past and the conditions and indications of the present in connection with this remarkable showing, there is certainly every reason to anticipate an indefinite continuance of this enormous production, if not a very considerable increase in the proportion to be credited to this country in the years to come. Nor is the increase confined to silver. Between the years 1897 and 1901 the exportation of gold, by Mexico, increased from $3,922,300 in the former year, to $8,595,353 in the latter; and of copper, from $6,152,202 to $10,177,752; the total product of gold, silver, copper, and lead in 1901 being $97,000,000 — the greatest in the history of the country to that time. From 1874–75 to 1894–95 inclusive, Mexico exported $616,741,920 of silver and coined $541,029,630. The exportation of silver ore did not begin until in the fiscal year 1886–87. Up to 31 Dec, 1888 there had been coined in the republic, $122,751,291 gold; $3,203,119,941 silver, and $6,400,214 copper; or a total of $3,332,271,447. This was exclusive of $200,000 coined by Viceroy Mendoza, 31,667, by Señor Aylion; and $4,000,000 in nickels, coined during the presidency of General Gonzales.

The exports of minerals during the fiscal year 1904–05 were: Gold, $13,696,145.45; silver, $65,523,645.70; copper, $29,803,420.63; lead, $5,504,669.11; other minerals, $1,110,361.39; total, $115,638,243.28; a decrease of $3,617,916.67 as compared with 1903–04. In the first eight months of 1905–06, the exports of minerals were: Gold, $22,208,440.47; silver, 85,037,609.05; copper, $20,258,902.23; lead, $3,646,295.77; antimony, $688,652.96; zinc, $148,211.99; other mineral products, $268,754.34; total $107,246,049.46, or $47,608,434.06 more than in the corresponding months of 1904–05.

In 1891 there were in the republic 11 mints, which were located respectively at Alamos, in the state of Sonora; Culiacan, in the state of Sinaloa; Chihuahua, Durango, Guanajuato, Guadalajara, Hermosillo, Mexico City, Oaxaca, San Luis Potosi, and Zacatecas. Under the recently adopted monetary laws these have all been closed except the one in Mexico City, which will continue to be operated indefinitely. It is equipped with the most modern machinery and appliances. The government is now having a considerable portion of its new coins made at mints in the United States.

The historian Humboldt, than whom no man has ever better known Mexico, or more justly or correctly estimated its natural resources, declared that it was destined to become "the treasure house of the world." In the years that have followed his residence and investigations in the country, there have accumulated abundant proofs of the wisdom and soundness of his prophesy. He might reasonably have based his opinion upon the fact that a single lode in one of three districts which together added to the world's wealth $252,000,000, or an average of more than $1,000,000 per annum between the years 1556 and 1803. And this is only one of innumerable instances of the wonderful productiveness of the mines of Mexico. The district of Zacatecas contributed over $810,000,000 toward the total production of the country between 1548 and 1900. The output of 989 mines in 1897 was $53,755,695; of 1,138 mines, in 1898, it was $65,129,840; and of 1,142 mines, in 1899, it was $89,044,906, or a total of $207,930,441 in the three years named. In the same period, the smelters and haciendas of the republic, which numbered 249 in 1897, had increased to 335 in 1898, and to 358 in 1899, treated ores to the value of $216,207,952. In 1903 there was produced by 1,098 mines, $94,870,301, and 519 smelters and haciendas treated $115,602,860 worth of ore.

The leading states in the production of minerals in 1903 were: Hidalgo, $19,190,341; Sonora, $13,468,358; Durango, $13,247,775; Chihuahua, $9,401,251; Coahuila, $6,961,551; Zacatecas, $6,252,196. The leading states in the value of ore smelted or treated were: Nuevo

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* The reason why the figures relating to silver bullion for the fiscal year 1904-05 appear so low, is that owing to the monetary reform, a sum of $16,000,000 remained in the country for coinage purposes.

OLEGARIO MOLINA,
SECRETARY OF FOMENTO, COLONIZATION AND INDUSTRY.

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Leon, $22,598,803; Aguascalientes, $20,135,005; Sonora, $13,329,214; Durango, $11,858,014; Jalisco, $7,218,176; territory of Lower California, $7,107,403; Hidalgo, $6,546,775; Coahuila, $5,679,422. The total product in 1903 was chiefly divided between the different metals and combinations of metals, as follows:

Gold and silver in combination.............	$41,218,867
Gold, silver, and lead in combination......	8,681,977
Gold, silver, and copper in combination....	1,854,181
Gold, silver, lead and iron in combination	1,012,000
Gold..................................	1,544,939
Silver..................................	12,360,672
Silver and lead in combination............	3,117,505
Silver, lead, and iron in combination......	2,022,370
Silver and copper in combination..........	1,377,417
Silver, copper, and lead in combination....	1,010,827

The principal gold producing states in 1903 were, in the order here named: Chihuahua, $640,900; Sonora, $209,470; Zacatecas, $182,000; Sinaloa, $136,139; Durango, $112,410. The principal silver-producing states were: Hidalgo, $4,056,181; Durango, $1,791,434; Zacatecas, $1,708,234; Chihuahua, $1,640,000; Sonora, $1,418,982; San Luis Potosi, $1,160,592. The principal copper-producing states were: Sonora, $6,804,596; Puebla, $2,157,655; territory of Lower California, $1,130,828; Zacatecas, $1,084,876. The leading iron-producing states were: Durango, $513,000; Jalisco, $74,625; Nuevo Leon, $43,892. Gold and silver in combination: Hidalgo, $15,031,652; Mexico, $5,438,853; Chihuahua, $5,046,121; Sonora, $4,003,939; Guanajuato, $2,844,845; Durango, $2,638,845; territory of Tepic, $1,309,508; Zacatecas, $1,195,243. Gold, silver, and copper, in combination: Durango, $1,059,543; Coahuila, $296,542; Chiapas, $178,895; Sonora, $145,000. Gold, silver, and lead, in combination: Durango, $7,045,153; Zacatecas, $1,351,953; Chihuahua, $256,866. Gold, silver, copper, and iron, in combination: San Luis Potosi, $1,000,000; Durango, $12,000. Silver and lead, in combination: Coahuila, $1,402,077; Chihuahua, $772,370; Durango, $311,498; Michoacan, $146,798; San Luis Potosi, $145,382. Silver, lead, and iron, in combination: Nuevo Leon, $1,200,440; Coahuila, $505,250; Chihuahua, $159,288. Silver, copper, and lead, in combination: Coahuila, $930,677. Silver and copper, in combination: Sonora, $810,400; Coahuila, $191,658; San Luis Potosi, $162,500; Durango, $109,592. Lead and iron, in combination: Nuevo Leon, $416,000. Coal, and coke: Coahuila, $3,472,407; Veracruz, $45,384. In 1904–05 large quantities of zinc were produced by the states of Nuevo Leon, Coahuila, and Chihuahua. This industry promises to become one of the most important in the republic.

Mexico's production of gold, silver, and copper alone, for the year 1904, is given as $117,147,351, placing the country first in silver, second in copper, and fifth in gold among all the countries of the world.

The mining of gold has been neglected because of the greater ease and more satisfactory results attending the development of the more extensive and widely distributed deposits of silver. In recent years, however, the interest in gold mining has been somewhat increased, especially in the state of Guerrero, by the greater efficiency of modern methods and mechanical appliances.

When the question of cheap fuel in this country has been satisfactorily solved, the mining of iron, which has been almost entirely neglected, will undoubtedly receive its full share of attention. It is estimated that there is enough of this metal in the republic, deposited beneath and near the surface, to supply the needs of the world. In the state of Durango, there is a hill or mountain 4,800 feet long and 640 feet high, which is composed of 70 per cent. pure iron, and is said to contain 300,000,000 tons of solid ore, without going below the surface of the surrounding plain. The depth of this deposit can only be guessed. The iron is highly magnetic in character. If further development of the coal deposits existing in Coahuila, and believed to exist in Puebla, Oaxaca, Sonora, Michoacan, Veracruz, Guerrero, Jalisco, Tlaxcala, Hidalgo, Tamaulipas, and Nuevo Leon, should confirm the value now claimed for them, both as to quantity and quality, there is reason to anticipate great activity in the near future, in the practical utilization of the enormous deposits of iron in this country.

According to the records of the Mexican department of Fomento, for 1903, there were in operation in that year 1,098 mines of various kinds, as follows: 359 gold and silver in combination; 174 silver; 111 silver and lead in combination; 79 copper; 58 gold; 54 gold, silver, and copper in combination; 50 silver, lead, and iron in combination; 42 gold, silver, and lead in combination; 36 silver and copper in combination; 15 iron; 13 silver, copper, and lead in combination; 13 gold, copper, and iron in combination; 12 lead; 11 silver, lead, and zinc in combination; 10 coal; 7 mercury; 7 gold, silver, lead, and zinc in combination; 6 gold, silver, copper, and lead in combination; 6 lead and iron in combination; 5 iron, zinc, and sulphur in combination; 5 gold, silver, copper, lead, and iron in combination; 5 copper and iron in combination; 3 gold, silver, and iron in combination; 3 silver and iron in combination; 2 gold and iron in combination; 2 gold, silver, lead, and iron in combination; 1 antimony; 1 antimony and iron in combination; 1 copper and lead in combination; 1 copper, lead, and iron in combination; 1 gold, copper, and lead in combination; 1 tin; 1 silver, copper, lead, and iron in combination; 1 silver, iron, and manganese in combination; 1 talc. In the working of these 1,098 mines there were employed 86,815 operatives, of whom 81,017 were men, 856 were women, and 4,942 were boys.

Of the 519 smelters and haciendas which, in 1903, smelted or treated the $115,602,860 worth of ores, 127 employed the smelting process; 116, the patio process; 93, the amalgamation; 56, the lixivation; 45, the concentration; 37, the plate; 25, the cyanization; 7, the smelting and roasting; 5, the mattes; 4, the leaching; and 4, the chlorination. The distribution of metals, which together made up the above total, gave to silver, $67,288,562; copper, $25,285,907; gold, $13,323,154; metal concentrates, $4,684,172; lead, $3,693,193; tailing concentrates, $551,116; iron, $297,252; mercury, $263,504; antimony, $216,000.

The metalliferous belt of Mexico extends from the state of Sonora in the extreme northwestern corner of the republic, in a southeasterly direction to and including the state of Oaxaca, the southern boundary of which is practically the Gulf of Tehuantepec. This great belt is 1,600 miles long and 250 miles wide and includes the states of Sonora, Chihuahua, Sinaloa, Durango, Zacatecas, Aguascalientes, Jalisco, San Luis Potosi, Guanajuato, Queretaro, Hidalgo, Mexico, Michoacan, Guerrero, Morelos, Puebla, and Veracruz. There are deposits in Coahuila, Nuevo Leon, and Tamaulipas; but these states are not considered as coming within the boundaries of the mineral belt proper. It is estimated that the state of Zacatecas has alone produced in three centuries over a thousand million dollars; and in the state of Queretaro, a single mine,— the "El Doctor," is said to have paid to the Spanish government $18,000,000 in taxes, in two hundred years. Queretaro is known as the opal state, because of its position as the greatest producer of opals in the republic. Among other precious stones found in various parts of the country in considerable quantities, are the topaz, ruby, emerald, garnet, cornelian, agate, sapphire, jasper, turquoise, and amethyst.

The British Minister to Mexico in 1827, writing of the mining industry of the country in that year, stated that in Guanajuato, 14,000 mules were in daily use in mining operations, and that the corn on which they subsisted sometimes cost from $2 to $2.50 per 150 pounds.

The Pachuca mining district, in the state of Hidalgo, is one of the richest in the republic. Its mines have annually produced immense quantities of silver and gold for three centuries, and are still producing at the rate of from two to three million dollars every month. Authentic records, which have been kept for thirty years past, show this production to have reached the enormous sum of one billion dollars in that period, and is now producing more than one-third, in value, of Mexico's mineral output.

Mexican miners receive from fifty cents to $1.50 a day and are able to work every day in the year without discomfort. Although somewhat slow to adopt modern methods and implements, they are, as a class, faithful and efficient operatives.

The mining laws of Mexico are considered as more nearly meeting the requirements of the mining industry in all its phases, than do those of any other country. Until 1884 they were wholly Spanish in their origin. In that year the present code was adopted. It gives mines in fee simple to discoverers who take the prescribed means for obtaining title to them. There is no forfeiture except in case of failure to pay the annual tax, which has been recently reduced to six dollars per mining claim of 2.47 acres, where twenty-five or more claims are contiguous and belong to one person or company. Only $2 per claim is charged for all over twenty-five. Formerly the tax was $10 in all cases, and this amount is still charged except under above conditions. This reduction has effected a saving to the mine owners of Mexico of over $4,000,000 annually. The rights of owners are amply protected and are absolutely secure. If a person discovers a mine on land owned by another person, he can only claim the mineral and enough of the surface to enable him to work the mine, and must properly compensate the owner of the land. However old or valuable a mine may be, it is subject to relocation in case its owner fails to comply with the laws. Any inhabitant of the country may make explorations for minerals. There is a prescribed form for making locations (denouncements), which must be properly filled out, signed, and submitted to the nearest "mining agent" of the district; or if there is no agent, then to the local postmaster. The expense of this formality is only one dollar. After the property has been examined and reported on by an expert selected by the "mining agent" or postmaster, four months are allowed other possible claimants to appear and present proofs of their claims. The experts receive an average of $15 and traveling expenses for each claim examined and reported on, and are allowed 60 days in which to report. Notification of location or denouncement must be published in the official journal of the district. The cost of this is from $2 to $4; the entire expense of completing title seldom exceeding from $10 to $12 per claim. All titles must be registered in the district in which the properties are located. For this there is no fee.

The government of Mexico is most liberal and considerate in its relations to the mining industry and to the men whose capital and energies are employed in its development. To this fact must largely be credited the confidence that has induced an investment to the present time of not less than $500,000,000 in the mines and smelters of the republic.

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10. Mexico — Manufactures. That Mexico is rapidly advancing as a manufacturing country and will soon take high rank in this respect, among the other great nations of the American continent, as she has already done in many others, is no longer open to question. Her creditable exhibits at the great industrial expositions of recent years have amply justified this prophecy. That these reflected great credit upon her artisans, her tillers of the soil, and her workers in all departments of industry, is nobly proven by the fact that their excellence was recognized on these internationally important occasions by official awards as follows:

City.	Year.	No. of Exhibits.	No. of Awards.
Paris	1889	3,026	953
Chicago	1893	3,658	1,177
Paris	1900	2,143	1,088
Buffalo	1901	859	611
St. Louis	1902	2,283	1,690

The significance of this showing is rendered even more creditable to Mexico as a rapidly developing country by the further fact that these 5,519 awards represent a little more than 46 per cent of the 11,969 exhibits made. A more convincing illustration of the wonderful growth of Mexico's substantial industries in recent years, or of her prospects for the future, than is supplied by her achievements at these five great international expositions could hardly be required, even by the most pessimistic student of industrial progress.

In considering the possibilities and prospects of manufacturing in Mexico, an encouraging circumstance is the disfavor with which the government looks upon everything savoring of the modern idea of quadrupling legitimate profits through the brutal power of organized monopolies or trusts. Here honest and properly directed effort, in whatever channel of investment or industry, can feel sure of justice and protection against all evil-disposed influences, whether in the form of individual or combined effort. The most serious obstacle in the pathway of the manufacturer on a large scale is the question of labor. But even this is gradually righting itself. Immigration from over-populated countries, the introduction and use of modern machinery, the spread of intelligence among the common people, a better understanding between employer and employed, the advancement of the masses toward higher ideals, and the civilizing influence of contact with the prevailing spirit of progress, all tend toward better conditions in this regard. It should be remembered that only a few years ago,—less than twenty,—about all the manufacturing in Mexico was conducted in the most antiquated and primitive way, without the aid of mechanical training, technical knowledge, or modern machinery or appliances. The only exception to this rule, so far as the writer is able to recall, was the manufacture of cotton, which was carried on at least a quarter of a century ago, at Queretaro, Orizaba, Puebla and a few other points with the aid of the best equipment and in accordance with the best methods then known and obtainable, notwithstanding that the machinery used had to be transported from the port of Veracruz to distant interior points over rough mountain roads, on the backs of donkeys and peons. Now the industry is the most important in the manufacturing line in the republic, and is growing more so with every passing year,—due rather to the introduction of foreign capital and the building of railways than to the increase of cotton growing, which has by no means kept pace with the increased demand. A single company, whose mills are located at Orizaba, in the state of Veracruz, has a capitalization of $15,000,000, employs 5,000 operatives and pays more than $1,000,000 annually, in dividends. The mills are owned by French capitalists and managed by an Englishman; the looms are manned by Mexican operatives, the designers are recruited from seven countries and it operates more machinery on a single floor and in a single room than does any other cotton mill in the world. There has never occurred a strike among the operatives, or other evidence of discontent, and I have the testimony of the manager that those in the mills of Manchester, in England, are not more expert or faithful in their work.

According to the latest reports obtainable the average daily wages paid cotton factory operatives average from $1.50 to $5.00 for foremen, $0.50 to $2.00 for spinners, $0.50 to $1.25 for carders, $0.50 to $1.25 for washers, $0.40 to $1.25 for weavers, $0.50 to $2.25 for dyers, $1.50 to $3.00 for machinists, $0.75 to $1.25 for firemen, and $0.40 to $1.00 for hands. As shown by the Department of Fomento there were in the entire republic 118 cotton mills in 1900, of which 9 were in the state of Coahuila, 3 in Colima, 1 in Chiapas, 3 in Chihuahua, 9 in Durango, 4 in Guanajuato, 2 in Guerrero, 2 in Hidalgo, 5 in Jalisco, 6 in Mexico, 5 in Michoacan, 4 in Nuevo Leon, 3 in Oaxaca, 20 in Puebla, 4 in Queretaro, 1 in San Luis Potosi, 3 in Sinaloa, 1 in Sonora, 7 in Tlaxcala, 9 in Veracruz, 13 in the Federal District, and 4 in the territory of Tepic. In the year named 58,459,913 pounds of raw cotton were used in these mills, producing 10,241,799 pieces of stamped and unstamped goods and 4,160,173 pounds of yarn. The operatives employed numbered $21,960. In 1904, the last year reported, the number of mills in operation was 119, employing 27,706 operatives, using 63,582,313 pounds of raw cotton and producing 12,406,528 pieces of stamped and unstamped goods valued at $42,510,910. Number of operatives employed, 27,706. Of the 641,060 spindles 120,192 were old style and 520,868 were modern, and of the 20,506 looms 4,213 were old style and 16,293 were modern. The leading consumers of raw cotton were the states Puebla, 15,092,222 pounds; Veracruz, 13,105,925; the Federal District, 5,006,927; Coahuila, 4,357,288; Mexico, 3,733,455; Tlaxcala, 3,608,758; Guanajuato, 3,382,851; Jalisco, 2,950,978; Durango, 2,085,150; Queretaro, 1,613,261; Nuevo Leon, 1,546,336; Michoacan, 1,385,593; Oaxaca, 1,254,869; Chihuahua, 1,145,124. No other state reached 1,000,000 pounds. The total value of the 1904 product of these cotton mills was $42,510,901.65, of which $10,276,335.71 is credited to the state of Veracruz, $9,897,973.51 to Puebla, $5,714,503.45 to the Federal District, $2,351,958.96 to Coahuila, $2,331,631.93 to Tlaxcala, $1,638,958.67 to Jalisco, $1,593,646.40 to Mexico, $1,591,675.63 to Guanajuato, $1,505,965.58 to Queretaro, and $1,061,549.88 to Nuevo Leon.

In 1904 there were in the republic 466 manufactories of cigarettes and cigars, the product of which amounted to 17,963,096 pounds or 482,776,915 packages of cigarettes; 135,820,739 cigars, weighing 1,714,389 pounds; 1,931 pounds or 8,375 packages of snuff; 141,802 pounds or 312,948 packages of fine cut chewing tobacco, and 29,055 packages or 10,796 pounds of plug tobacco. Of the total production of cigarettes the Federal District is credited with considerably more than two-thirds, or 210,156,645 packages of cigarettes and 49,751,025 cigars. The leading states in the manufacture of cigarettes, in the order of numbers made, are, Sinaloa, Michoacan, Guanajuato, Puebla, Oaxaca, and Veracruz. In cigars Veracruz leads the states with 33,313,056 and is followed by San Luis Potosi with 13,431609; Aguascalientes, 9,671,205; Puebla, 8,074,184, and Michoacan, 5,698,886. This industry is one of the most extensive and profitable in the republic, and the product is constantly advancing in quality as well as in quantity.

A comparatively new and rapidly developing industry in Mexico is the manufacture of iron and steel products, extending along the line from railway rails and heavy structural materials to the smallest bolt or nut. At Monterey, in the state of Nuevo Leon, a single company, established in 1900, and having a capital of $10,000,000, is turning out 60,000 tons of manufactured product annually and will at once increase its capacity to 120,000 tons. It is unable to supply the demand for its products. There are also iron works in the states of Jalisco and Hidalgo, but these are not nearly as extensive as is the Monterey plant. Small foundries exist in all parts of the republic. Under the existing policy of protection, which Mexico has copied from the United States, this industry is enjoying prosperity and promises rapid and uninterrupted growth. Among the several other lines of manufacture which have only recently begun to manifest signs of active and aggressive life, are household furniture, men's clothing, boots and shoes, paints, varnish, soap, wheat flour, and paper. Others are being constantly added to the list. Of the more important lines in the industrial history of the country are: sugar, aguardiente, tequilla, pulque and other alcoholic liquors, hats, rebozos, zerapes, pottery, drawnwork, and candles. Of sugar almost 140,000 tons were made in 1905. The manufacture of aguardiente in 1904 amounted, in value, to $11,836,126; of sugar, $16,974,547; of molasses, $5,303,032; of syrup, $3,335,317; of pulque, $11,125,032.

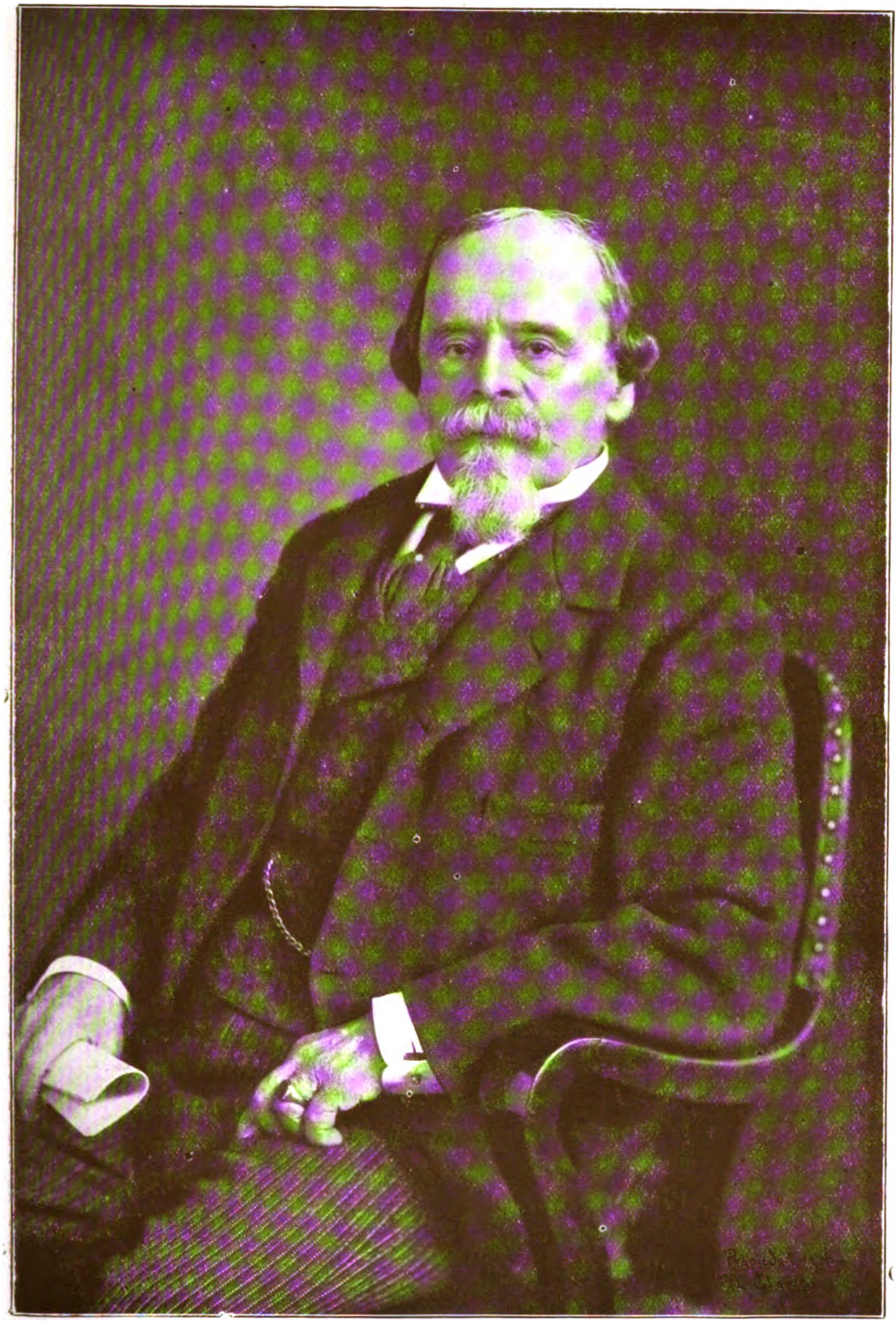
Elisha Hollingsworth Talbot,
Author of 'Commercial and Industrial Mexico.'

11. Mexico — Commerce. From 1874 to 1904,— a very brief period as time is computed in the making of a nation's history,— the exports of merchandise by Mexico to the United States increased from $4,346,334 to $43,633,275, and the imports from the United States increased from $5,946,839 to $45,844,720. In the fiscal year 1905–06 the imports from all countries amounted to $220,651,074. Of this sum $16,386,828.71 consisted of animal substances; $32,616,928.93 of vegetable substances; $90,937,430.56 of mineral substances; $23,022,528.30, of dry goods; $7,744,272.98 of chemical and pharmaceutical products; $7,246,351.07 of spirituous liquors and other beverages; $5,417,192.11 of paper and its applications; $20,539,212.70 of machinery and its parts; $4,620,031.53 of vehicles; $4,122,237.03 of arms and explosives, and $7,998,060.57 of miscellaneous articles. Increase over the previous year, $42,446,112.04. In the same year the exportations totaled $271,138,809.32, the principal articles being: gold in various forms, $31,695,777.38; silver in various forms, $125,400,083.77; copper, $28,655,897.35; vegetable products, $62,928,135.51; animal products, $11,723,435.23; manufactured products, $2,978,441.02; miscellaneous, $799,621.57. Increase over the previous year, $62,618,357.89. Of the total importations, $145,600,313.49 were from the United States; $20,814,557.09 from Germany; $20,344,643.81 from Great Britain; $16,383,255.95 from France, and $7,595,531.31 from Spain, the remainder being divided among the other countries in amounts ranging from $1,000 to $2,500,000. In the same period. the exportations totaled $271,138,809.32, as follows: gold in various forms, $31,695,777.38; silver in various forms, $125,400,083.77; copper, $28,655,897.35; lead, $4,967,806,23; other minerals $1,989,621.26; coffee, $9,288,623.32; henequen, $29,437,318.50; hides, uncured, $7,882,867.25; vanilla $4,157,394.99; textile, $3,667,844.88; beans, $3,791,212.97; cattle, $3,271,837.50; leaf tobacco, $2,216,282.06; chewing gum, $1,696,523,33; fresh fruits, $295,334.20; zacaton root, $1,872,757.00; woods, $1,881,961.68; sugar, $674, 235.00; panama hats, $556,748.29; miscellaneous, $6,939,060.79. Of the total exportations, $166,010,052.43 were to the United States; $41,672,873.19, to Great Britain; $20,523,156.33 to Germany; $8,010,279.73, to France; $7,266,821.73 to Belgium; $2,201,295.00 to Spain, and $528,377.80 to Guatemala; no other country receiving $500.000. In the previous fiscal year the importations were $178,204,962.45, and the exportations, $130,303,978.09. Only as far back as the fiscal year of 1894–95, the imports amounted to but $66,200,000 and the exports to $95,000,000, a remarkable record of material progress in the brief period of 11 years.

With the increase of commercial transactions there necessarily comes a corresponding increase of public revenues and expenditures, which, in Mexico, has been phenomenal, amounting in the ten years ending with 1904, to $5,755,207.30 in revenues and $5,897,157.19 in expenditures of the states, and to $50,302,761.20 in the revenues, and $31,215,547.13 in the expenditures of the Federal Government. The increase of revenues and expenditures of the municipalities of the country have also been considerable, amounting in the same period to $2,343,755.48 in revenues, and $2,346,354.47 in expenditures. It is both instructive and interesting to note the almost uninterrupted increase of imports and exports in the past 12 years, as shown in the following table:

Year.	Exports.	Imports.
1894—95	$95,000,000	$66,200,000
1895–96	110,000,000	78,700,000
1896–97	117,000,000	83,200,000
1897–98	138,000,000	97,200,000
1898–99	148,400,000	107,600,000
1899–1900	158,200,000	128,700,000
1900–01	158,000,000	133,000,000
1901–02	171,000,000	151,200,000
1902–03	207,300,000	191,300,000
1903–04	210,300,000	177,800,000
1904–05	208,520,451	178,204,962
1905–06	271,138,809	220,651,074

Further evidence of the wonderful commercial growth and importance of Mexico in recent years may be found in the statistics of the business done through her ports of entry. In 1904, the total number of steam vessels entering these ports was 4,744, having an aggregate carrying capacity of 4,984,437 tons, and the number of sailing vessels was 2,796, with a total carrying capacity of 367,131 tons. The actual amount of cargo discharged was 4,559,101 tons by both steam and sailing vessels. In the same year, 4,737 steam and 2,807 sailing vessels departed from the ports of the country, carrying a total cargo of 3,466,568 tons. From 1889 to 1904 inclusive there was an increase of 2,324 in the number of vessels, both steam and sailing, which entered these ports. Of the entries in 1904, there were 5,946 from the ports of the republic, 822 from the United States, 351 from England, 122 from Cuba, 94 from Germany, 57 from Guatemala, 30 from France, 20 from Brazil, and 15 from Spain, while of the total sailings, 5,892 were to the ports of the republic, 916 to the United States, 305 to England, 208 to Cuba, 67 to Germany, 54 to Guatemala, 20 to Spain, 15 to France, 15 to Italy, and 12 to Australia. Of the total entries, there were through the port of Alvarado 43, Campeche, 764, Coatzacoalcos, 282, Chetumal, 131, Frontera, 297, Isla del Carmen, 372; Progreso, 740; Tampico, 528; Tuxpan, 110; Veracruz, 774; all Gulf of Mexico ports. The entries through Pacific ports were: Acapulco,



IGNACIO MARISCAL,
Secretary of Foreign Relations.

Photo by Clarke, Mexico.

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201; Altata, 233; Ensenada, 141; Guaymas, 539; La Paz, 441; Manzanillo, 183; Mazatlan, 571; Puerto Angel, 40; Salina Cruz, 86; San Benito, 46; San Blas, 237; San Jose del Cabo, 116; Santa Rosalia, 446; Tonala, 51; Topolobampo, 170. In order to show the relative importance of the Mexican custom houses, both maritime and frontier, the folowing statement of collections of import duties for the month of August, 1906, is given: Veracruz, $1,410,326.28; Tampico, $597.474.93; Laredo, $448,267.55; Juarez, $313,004.59; Progreso, $310,400.06; Mexico City, $240,635.90; Ciudad Porfirio Diaz, $179,423.00; Nogales, $66,730.03; Mazatlan, $64,259.58; La Morita, $60,006.61; Frontera, $28,821.65; Agua Prieta, $23,146.39; Coatzacoalcos, $16,956.02; Campeche, $15,639.17; Soconusco, $15,512.55; Guaymas, $11,445.79; Acapulco, $8,194.25; Manzanillo, $6,434.17; Matamoras, $6,034.62; Santa Rosalia, $5.544.25; Isla del Carmen, $5,124.42; Ensanada, $4,903.37; Mexicali, $4,661.66; Altata, $3,860.19; Chetumal, $3,332.89; La Paz, $3,269.05; Tuxpan, $2,434.43; San Blas, $2,013.44; Salina Cruz, $1,979.09; Tijuna, $1,043.62; Topolobampo, $1,031.25; Guerrero, $517.64; Tonala, $500.57; Las Vacas, $412.60; La Ascension, $317.74; Camargo, $108.61; Zapaluta, $59.43; Mier, $51.37; Puerto Angel, $26.94. In the upbuilding of the foreign commerce of Mexico, the construction of railways made possible the phenomenal results that have been achieved in the last 25 years. The entire foreign trade of the country, practically, has been created since 1875, most of it since 1880. Before competition in the transportation of freight was provided, the rate from Veracruz to Mexico City, 264 miles, ranged around $68.00 per ton, going as high as $330.00 during the French intervention. For several years past, the rates on all lines of railway have been such as to encourage and protect industrial development in every part of the republic. Next in importance, in the great work of placing this wonderful country where it justly belongs in the list of nations, have been the hundreds of millions of American dollars, and the army of enterprising American financiers, miners, manufacturers, agriculturalists and merchants that have crossed the Rio Grande, cast their lot among these kindly people and pinned their faith on the stability of this government and the sound business policy of the men who control its destinies.

Among the very important matters in connection with the exporting of merchandise to Mexico, and in regard to which all exporters should fully inform themselves, and by which they should be strictly governed in making shipments, are the Mexican customs regulations. These are strictly enforced, and are not unreasonable in their requirements, which are that duplicate copies of bills of lading covering the goods to be exported shall be sent to the custom house broker at the port of import, together with a copy of the invoice and manifest, and a packing list, and that the original bill of lading and invoice shall be sent direct to the consignee, that the packing list shall show, the marks, counter-marks and number of packages, and contents of each, and the principal material of which each article is made, and if plated, must state with what it is plated, gross weight and the kind of goods in each package, the legal weight of each package, name of consignee, destination, and the name of the custom house broker in whose care the freight is consigned. The valuation must in all cases represent the actual value of the merchandise at the point of shipment. If articles are undervalued they are subject to a fine, although the value may cut no figure in the duties, all of which are specific. This rule applies also to declarations regarding weight and class of merchandise, which must be given correctly, otherwise a fine will be imposed. Weights and measures are expressed according to the metric system, and should be so plainly written that no mistake can be made in reading them. In addition to the weights, the number of gallons should also be given in exporting wines or brandies. The length and width of each piece of cloth fabric must be given, including fringes. Declarations as to weight and class of merchandise must be exact. If undervalued or underweighed a fine will be imposed. Duties on animals are based on the head, and all animals except hogs and geldings are admitted free. On all other classes of merchandise the duties are based on weights and measures, except on brandies, wines and whiskies, which pay on the gallon; and on boots and shoes, which pay on the pair.

From 1876 to 1905 the imports by Mexico, according to the United States Department of Commerce and Labor, increased four fold and the exports seven fold. Formerly almost all the furniture imported by Mexico came from France, but now it is supplied by the United States. Most of the importations of agricultural machinery and implements are from the United States. The same is true of food stuffs, lumber, machinery for irrigation works, supplies for mining and for steam and electric railways, unmanufactured leather, vehicles, boots and shoes, canned goods, patent medicines, live stock, cotton, manufactures of steel and iron, sewing machines and typewriters. From Spain and France come most of the wines, and the whisky is supplied by the United States and Scotland. Germany has long had a monopoly of the hardware trade, England of the dry goods trade, and France of the trade in notions, jewelry and fancy goods. Among the leading articles exported by Mexico are coffee, two thirds of which goes to the United States and the balance to England, Germany and France, vanilla, sugar, tropical fruits, beans, live stock, precious metals, henequen, leaf tobacco, hides, rubber and ixtle.

Mexico has a "commercial code" which was "decreed" by the President in 1887, and which, among other things, provides that foreigners shall be free to engage in commerce, subject to the same conditions and requirements that apply to citizens; that all documents referring to matters of public concern shall be recorded in a public register; that all business correspondence shall be preserved; that notice by circular or through the press shall be given of the character of any business about to be established and of any modifications or other changes subsequently made; that at least three account books,— a general day book, a book of inventories and balances and a ledger,— shall be kept in the Spanish language; that all brokers must be Mexicans by birth or naturalization, have a mercantile education and possess a diploma from the Minister of Fomento or other proper officer; that an unlawful agreement or contract involves no cause of action at law; that mercantile companies may consist either of a partnership under a collective name or with special partners, or may be an anonymous (stock) company, a society with special partners or a co-operative society; that all contracts for the formation of companies must be in writing and very full and explicit; that the consolidation of companies cannot take effect until two months after publication of particulars, except on payment of all debts; that foreign companies must register in Mexico and publish an annual balance sheet; that there may be «temporary» or «profit-sharing» mercantile associations, the first being without a firm name and making partners jointly liable to third persons, and the last named implying an association under which two or more persons may become interested in operations which one or more may undertake in their own names, but which involve only one legal entity and no responsibility on the part of a partner not joining in a contract with a third party; that the principal of any manufacturing or commercial business shall be responsible for the acts of his managers or employes; that no institution of credit can be established except by authorization of the Minister of Finance and the approval of Congress; that every merchant ceasing to make his payments, whose liabilities are more than 25 per cent. in excess of his assets, who has made formal assignment of his goods, or who has absented himself without leaving any person in charge of his business who can pay his debts as they become due, shall be considered a bankrupt.

ANTONIO LEON-GRAJEDA,
Vice-Consul of Mexico, New York.

12. **Mexico — Tranportation.** Until as late as 1873 but little real progress had been made in providing suitable means of transportation in Mexico. Nineteen years previously the first railway—a three mile line from Mexico City to Guadalupe—had been completed, and also one from Veracruz to Tejeria, 12 miles. Both these are now a part of the Mexican line. In 1861, the Tejeria road was extended to Paso del Macho, 35 miles further inland from Veracruz, the work being done by the French army as a military necessity. Here the English company which still owns and operates the completed road from Mexico City to Veracruz, took over the enterprise and pushed its extension from Guadalupe to Apizaco. Then followed the exceedingly difficult and expensive task of building the mountain division between Esperanza and Paso del Macho, at that time regarded as one of the most difficult feats of engineering that had ever been attempted. In 1873 the entire line was completed, and Veracruz was at last connected with the capital of the nation by a band of iron—a long and sadly needed commercial and industrial convenience. Until then there had been no practical effort toward even the building of decent wagon roads, and the problem of transportation had proven to be the most difficult in connection with the preliminary work of development then just being inaugurated. How well the government stood by this initial railway of the great system which now consists of over 10,500 miles of track, is seen in the fact that for 28 years it extended practical support and assistance in the shape of an annual cash subsidy of $560,000—a grand total of $15,680,000 in the period named—a royal gift, indeed, and one that has been repaid many fold in resultant benefits. It was the first step in the march of enlightened progress that has now become a resistless onrush, with no sign of abatement.

From the day when Porfirio Diaz entered upon his wonderful career as President of Mexico, the question of transportation has been one of the most seriously considered and liberally treated of the many that have had to be met. Until then the burro, the mule and the peon had supplied all needs, not even being obliged to divide honors with canal boat or «prairie schooner,» and these primitive means had been generally considered quite equal to the necessities then existing. To successfully inaugurate a policy of railway building and commercial and industrial development, this Moses had not only to spend lavishly of the country's very limited treasure, in the way of cash subsidies, but to overcome the habits and prejudices of centuries, and to actually create a sentiment favorable to the new policy. «He builded better than he knew,» for he has already lived to see the fruition of his most sanguine hopes, in the construction of a network of railways extending from the great gulf, at Veracruz, to Tuxpan, to beautiful Patzcuaro lake, and to the coffee groves of Uruapan, in the far southwest: from the United States border at El Paso, Eagle Pass and) Laredo to Salina Cruz, on the Gulf of Tehuantepec: from Matamoros, where the Rio Grande empties into the Gulf of Mexico, and from the rapidly growing port of Tampico to San Marco, almost in sight of the Pacific Ocean; from Nogales, on the Arizona border, due south to Guaymas, on the Gulf of California, and between many interior points in various parts of the republic, already aggregating almost 11,000 miles of modern built track, with other thousands under construction or projected with every prospect of early completion. Following the building of the Mexican railway, connecting the capital with the country's most important port, Veracruz, the Central line was pushed rapidly southward from the United States border at El Paso, Texas, touching in its 1225 mile course the important cities of Chihuahua, Zacatecas, Aguascalientes, Leon, Guanajuato and Queretaro. Work on this great enterprise was begun in 1881 and finished in 1884, an accomplishment which commanded the unstinted admiration of the Mexican people, who had not before witnessed so remarkable an exhibition of energy. The National line, which had been commenced in 1880, was not finished until 1885, unavoidable and unanticipated obstacles having interfered to cause delay.

Starting the list of Mexican railways and their several branches, with the Central system, and following with the others in the order of their mileage, we have the following very creditable showing:

MEXICO — TRANSPORTATION

MEXICAN CENTRAL SYSTEM.

	Miles.
El Paso, Texas, to Mexico City, main line	1,224
Aguascalientes to Tampico and La Barra	425
Monterey to Tampico	322
Irapuato to Ameca	217
Saltillo to Torreon	190
Mexico City to Balsas	181
Guadalajara to Tuxpan	120
Monterey to Ceres	158
Jiminez to Rosario	97
Mexico City to Tepenacasco	88
Los Reyes to Yurecuaro	86
Gomez Palacio to Ceres	68
Tula to Pachuca	45
La Vega to San Marcos	29
San Bartolo to Rio Verde	25
Tepenacasco to Honey	23
Silao to Guanajuato	15
Telles to Pachuca	12
Cobre to Rincon de Ramos	11
Adrian to Santa Barbara	5

NATIONAL SYSTEM.

Laredo to Mexico City, main line	803
Ciudad Porfirio Diaz to Durango	540
Mexico City to Veracruz	339
Mexico City to Uruapan	321
Monterey to Matamoros	205
Durango to Tepehuanes	135
Mexico City to Puente de Ixtla	135
San Lorenzo to Verreyes, via Puebla	119
Cuautla to Puebla	107
Reala to Monterey	72
Mexico City to Pachuca	68
Tlahuillo to Torreon	58
Maravateo to Zitacuaro	53
Gonzales to Acambaro	53
Gonzales to Jaral	52
Oriental to Tezeutlan	52
Tepa to Beristain	50
Monclova to Cuatrocienegas	42
Rincon to Pozos	37
Vanegas to Matehuala	29
Barroteran to Muzquez	25
Tepa to Irollo	21
Ventoquipa to Tortugas	17
San Pedro to Hornos	14
Sabinas to Hondo	14
Horizonte to Bermijillo	14
San Isidro to Portrero	11
Atencingo to Tlancualpican	7
Virreyes to San Juan	7
San Juan to Concepcion	7
Pedriceña to Velardeña	6

NATIONAL OF YUCATAN.

Merida	to	Valladolid	181
"	"	Campeche	108
"	"	Izamal	42
"	"	Uxmal	40
"	"	Progreso	23
"	"	Chiczulub	23
"	"	Hunucma	23

MEXICAN.

Mexico City to Veracruz	263
Apizaco to Puebla	30
Ometusco to Pachuca	28

VERACRUZ AND PACIFIC.

Cordoba to Santa Lucrecia	205
Veracruz to Tierra Blanca	63

SONORA.

Nogales to Guaymas	265

MEXICAN SOUTHERN.

Puebla to Oaxaca	229
Tehuacan to Esperanza	31

TEHUANTEPEC NATIONAL.

Coatzacoalcos to Salina Cruz	189
Juile to San Juan Evangelista	18

KANSAS CITY, MEXICO AND ORIENT.

Chihuahua to San Sostenes	73
Topolobampo to Hornillos	73
Miñaca to Ataros	32

CHIHUAHUA AND PACIFIC.

Chihuahua to Temosachic	168
La Junta to Miñaca	6

PAN AMERICAN.

	Miles.
San Geronimo to Pijijapan	163

RIO GRANDE, SIERRA MADRE AND PACIFIC.

Ciudad Juarez to Terrazas	156

MERIDA AND PITO.

Merida to Pito	95
Merida to Huhi	38

COAHUILA AND ZACATECAS.

Saltillo to Concepcion	78
San Pedro to Avalos	17

SAN RAFAEL AND ATLIXCO.

Mexico City to Apapasco	69
Atlanta to Ozumba	19

MEXICAN NORTHERN.

Escalon to Sierra Mojada	78

NACOZARI.

Douglas, Arizona to Nacozari, Mexico	77

NATIONAL MEXICAN CONSTRUCTION CO.

Manzanillo to Colima	59
Zacatecas to Trancoso	15

PARRAL AND DURANGO.

Mesa de Sandia to Minas Nuevas	53

TLACOTEPEC AND HUAJUAPAM DE LEON.

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Practically, all communities in the republic having a sufficient population to justify the building of tramways or street railways are provided with them, and as a rule these properties have proven to be profitable to their owners and satisfactory to the public. In the National Capital and leading from that city to outlying towns, the service is excellent in every respect.

In considering the reciprocal benefits of the government's policy of encouragement, in its relations to the railway lines of the country, completed and projected, at least a fair offset for the subsidies that have been given or may be given, is presumed to exist in the provision which obliges all subsidized lines to carry the mails free and to deduct from 40 to 50 per cent. from regular freight and passenger rates, on government business. What, with the present completed mileage, the extensions and new lines under construction and the numerous projects which are expected to materialize in due course, it is not unreasonable to anticipate that by 1910 a grand system of not less than 15,000 miles of railway will be in profitable operation in Mexico; penetrating the mountain fastnesses and rich plains and valleys that have not yet heard the sound of the locomotive, and adding untold millions to the sum total of the country's wealth.

According to Federal statistics, the total earnings of the steam railways of the country in 1904 were: passenger, $23,236,679.92; freight, $57,531,515.78; total earnings 1904, $80,768,195.70.

Water Transportation.—The development of the means of transportation of Mexican commerce by water has been very marked in the last few years, several new lines of steamers and many new vessels having been added to the already important fleet. From the various Mexican ports the following steamer lines provide regular sailings:

Ward —Veracruz to Progreso, Havana, New York, etc.

West India & Pacific.— Veracruz, Tampico, New Orleans, Liverpool.

Compania Transatlantica Francesa.— Veracruz, Havana, Santander, etc.

Compania Transatlantica Española.— Veracruz, Havana, Bilboa, etc.

Harrison.— Veracruz, Tampico, New Orleans, Liverpool, etc.

Escalante.— Progreso, Campeche, New York, etc.

Cuban (Cayo).—Veracruz, Galveston, New Orleans, London, etc.

Benemilis.— Veracruz, Mobile and Cuban ports.

Bacon.— Veracruz and Gulf ports of the United States.

Kosmos.— Pacific ports and South and Central American ports.

Venezuela.— San Juan Bautista, Frontera, etc.

Mexicana de Navigacion Co.— Tampico, Veracruz, Coatzacoalcos, Frontera, Campeche, etc.

Hamburg-American.— Veracruz, Tampico, Havre, Hamburg, etc.

Mexican-American.— Veracruz, Tampico, Progreso, Galveston.

Mala del Pacifico.— Salina Cruz, Acapulco, Manzanillo, San Blas, Mazatlan, San Francisco.

Munson.— Mexican and Cuban ports.

Tabasco-Chiapas Trading Co.— Mexican ports to United States, South America and Europe.

Yucatan.— Between Mexican ports.

Unione Austriaca di Navigazione.— Mexican ports to Austria-Hungria and Central and South America.

Mexico & Texas Commercial Co.— Mexican ports to United States, Central and South America and Europe.

Desarrollo.— Lower California and United States ports.

Pacific Coast.— Mexican ports and San Francisco.

China Commercial S. S. Co.— Mexican, United States and Asiatic ports.

Naviera del Pacifico.— Between Mexican ports.

There are steamer lines on the Grijalva, Usumacinta, Coatzacoalcos, Papaloapan, Palizada, Chilapa, Tulija, Yaqui, Guaymas and other rivers of the republic.

The Federal Government recently secured practical, if not absolute control of the National railway system, and indications point to a growing sentiment in official circles favorable to the idea involved in this very important transaction. It is even asserted in well informed quarters that in due time one or more of the other great lines may follow the lead of the National.

The building of the Tehuantepec railway from Coatzacoalcos, on the Atlantic coast, to Salina Cruz on the Pacific, across the narrowest part of the republic, a distance of only 189 miles, has effected a saving of 870 miles over the Nicaragua route, and of 1,429 miles over the Panama route between New York and San Francisco.

Of the $700,000,000 (gold) invested in Mexican enterprises by Americans, it is estimated that over $450,000,000 found lodgment in the railways of the republic.

ELISHA HOLLINGSWORTH TALBOT,
Author of Commercial and Industrial Mexico.

13. Mexico — Finance. The first banking establishment in Mexico,— a department of the old Monte de Piedad (National Pawnshop),— dates back to the year 1776. Circulating notes were issued by it in commercial transactions, for more than 100 years and then withdrawn, the government having in 1881 granted the exclusive privilege of issuing notes, to the National Bank. The first bank organized to do business in accordance with modern methods was the Bank of London and Mexico, which was established in the City of Mexico in 1864 and is now the second financial institution in the republic in importance. Its capital which was originally $500,000 is now $21,500,000 and its reserve is $10,750,000. In addition to these two banks there are now 26 others in the republic which issue notes, as follows:

NAME OF BANK.	LOCATION.	CAPITAL.
Mineral Bank	Chihuahua	$5,000,000
Yucateco Bank	Merida	12,000,000
Mercantile Bank	Merida	6,000,000
Bank of Durango	Durango	2,000,000
Bank of Zacatecas	Zacatecas	1,000,400
Bank of Nuevo Leon	Monterey	2,000,000
Bank of the State of Mexico	Toluca	3,000,000
Bank of Coahuila	Saltillo	1,600,000
Bank of San Luis Potosi	San Luis Potosi	1,100,000
Bank of Sonora	Hermosillo	1,300,000
Occidental Bank	Mazatlan	1,500,000
Mercantile Bank	Veracruz	3,000,000
Bank of Jalisco	Guadalajara	6,000,000
Mercantile Bank	Monterey	2,500,000
Oriental Bank	Puebla	6,000,000
Bank of Guanajuato	Guanajuato	3,000,000
Bank of Tabasco	San Juan Bautista	1,000,000
Bank of Chiapas	Tuxtla Gutierrez	500,000
Bank of Hidalgo	Pachuca	1,000,000
Bank of Tamaulipas	Ciudad Victoria	1,000,000
Bank of Michoacan	Morelia	600,000
Bank of Aguascalientes	Aguascalientes	600,000
Bank of Oaxaca	Oaxaca	1,000,000
Bank of Morelos	Cuernavaca	1,000,000
Bank of Queretaro	Queretaro	1,000,000
Bank of Campeche	Campeche	1,000,000
Bank of Guerrero	Ignola	500,000

There are two banks of hypothecation,— the «International and Hipotecario,» capital $5,000,000, the «Agricola and Hipotecario,» capital $2,000,000, both of Mexico City, and two banks of «promotion,»— the Central, of Mexico City, capital $10,500,000, and the Commercial, of Chihuahua, capital $200,000. The aggregate capitalization of the 33 banks of issue, on 31 Aug. 1906, was $148,100,000; amount of notes in circulation $93,370,448; bonds in circulation, $17,725,200; reserve fund $53,904,908.21. On the date named these banks had on hand, in gold, $42,144,705.87; in silver, $28,385,769.86; in notes of other banks, $4,766,605.00; their loans on securities were $99,495,753.34; loans on mortgages, $22,039,481.50; money on call, $23,081,953.14; debtor account, $232,989,885.95; value of buildings, $6,230,687.70; notes in circulation, $93,370,448; bonds in circulation, $17,725,200; sight deposits, $38,340,543.49; term deposits, $27,226,546.20; credit account, $270,184,170.65; reserve, $53,904,908.21. The total business for the month was $618,851,816.55. In July it reached $623,813,434.17.

There has been a remarkable increase in bank transactions in the last few years, necessitating the addition of $99,600,000 since 1898, and $42,250,000 since 1902, to the capital employed in banking in the republic. From 31 Aug. 1903, to 31 Aug. 1906, sight deposits increased from $7,857,083.10 to $38,340,543.47; term deposits from $5,984,994.19 to $27,226,546.20; reserve from $19,887,457.81 to $53,904,908.21 and value of buildings from $3,437,858.69 to $6,230,687.70. The profits realized and distributed on account of the business of these banks for the year ending 31 May, 1906, were $19,251,994.19. These figures do not include the banks which have not the privilege of issuing notes.

The National Bank maintains branches in the cities of Chihuahua, Durango, Guadalajara, Guanajuato, Mazatlan, Merida, San Juan Bautista, Monterey, Oaxaca, Puebla, San Luis Potosi, Veracruz, Zacatecas, and Tampico; and the Bank of London and Mexico is similarly represented in Veracruz, Puebla, Quaretaro, Lerdo, Monterey, Guanajuato, Guadalajara, San Luis Potosi, Morelia, and Mazatlan. The Central Bank, of Mexico City, is practically a clearing house for the country banks throughout the republic, all of which own more or less of its stock and are its correspondents in the cities where located. The total banking capital of the republic, including banks of issue and all others which make their capitalization public, is $161,800,000 Mexican money. If to this amount be added the capital of the half dozen or more institutions which do not make this feature of their business public, or which are branches of foreign banks, as in the cases of the bank of Montreal and the International Banking Corporation, the grand total becomes considerably larger.

The following list represents the banking institutions which, not having organized under government concession do not issue circulating notes but which enjoy all other privileges granted to banks of issue:

NAME OF BANK.	LOCATION.	CAPITAL.
United States Banking Co.	Mexico City	$2,000,000
Mexico City Banking Co.	Mexico City	500,000
Mercantile Banking Co.	Mexico City	500,000
Industrial & Commercial Bank	Mexico City	10,000,000
United States & Mexican Trust Co.	Mexico City	Capital not given.
Bank of Montreal (Branch)	Mexico City	Capital not given.
International Banking Corporation (Branch)	Mexico City	Capital not given.
American Bank	Mexico City	Capital not given.
El Oro Trust Co.	El Oro	100,000
Veracruz Banking Co.	Veracruz	100,000
Saltillo Banking Co.	Saltillo	200,000
American Bank	Torreon	100,000
Guadajalara Banking Co.	Guadalajara	Capital not given.
Orizaba Banking Co.	Orizaba	Capital not given.
Cananea Banking Co.	Cananea	Capital not given

It is greatly to the credit of the banking system of Mexico that no bank operating under a government concession has ever failed. And the same is true of banks without concession, which have restricted their business to legitimate manking transactions. The high estimate in which the shares of Mexican banks are held at home is shown by the following table of prices quoted in Mexico City, 19 Oct. 1906, for nine favorite issues:

NAME OF BANK.	FACE VALUE OF SHARES.	PRICE BID.
National Bank, Mexico City	$100	$378
Mercantile Bank, Merida	100	270
Bank of London & Mexico, Mexico City	100	253
Bank of Sonora, Hermosillo	100	230
Bank of Nuevo Leon, Monterey	100	198
Bank of San Luis, Potosi	100	190
Yucateco Bank, Merida	100	187
Central Bank, Mexico City	100	178
Mercantile Bank, Veracruz	100	174
International & Hipotecario Bank, Mexico City	100	173

Banking in Mexico ceased to be a monopoly on the adoption of the law relating to «institutions of credit,» 19 March 1907. Up to that time only two banks of issue had been allowed.

— the National Bank of Mexico, and the Bank of London and Mexico. Now there are 33 which issue ordinary bills or notes, and two which issue cash bonds that are a first lien on their assets. Three of the 33,— the National Bank, the Bank of London and Mexico, and the Central Bank, all of Mexico City, have a combined capital of $74,500,000.

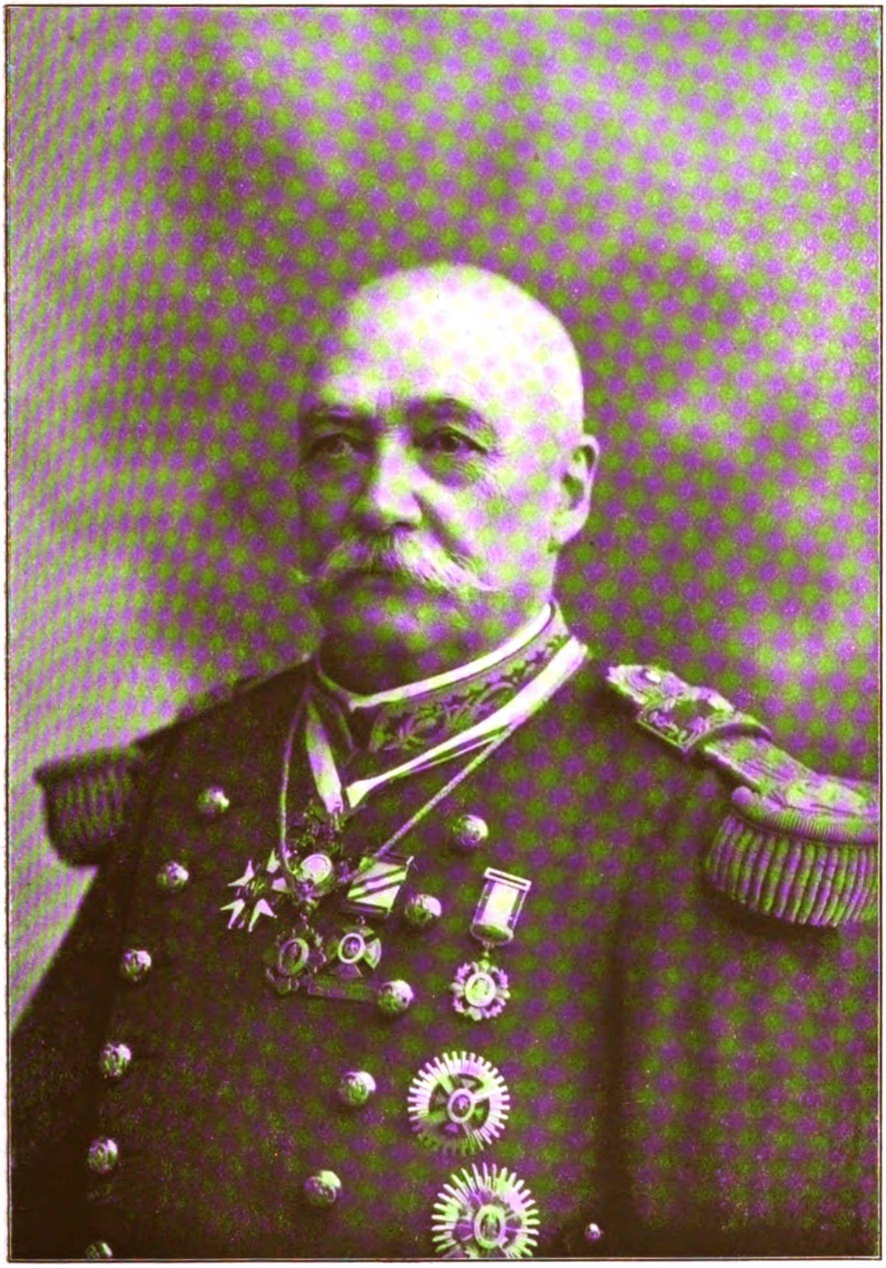
From 1808, when Spanish rule ended, to 1867 inclusive, the total revenues of the country were a little less than $816,000,000, and in the same period the expenses were $791,000,000. But it was not until 1896 that the government of Mexico experienced the peace of mind and real joy resulting from the knowledge that there reposed in the national vaults a respectable surplus over and above immediate necessities. In that year the country, for the first time in its history, and after a most trying and embarrassing strugle with the financial problem, which had continued through 30 years of hard earned peace, attained the solid footing the foundation of which is credit. In that year the credit side of the great ledger showed a surplus of $6,000,000. In that year interstate duties were abolished. In that year the era of progress was inaugurated which has had no check and which promises an uninterrupted future of substantial prosperity.

It was in 1825 that Mexico contracted her first debt, borrowing in London £10,000,000 sterling, with which to purchase war ships and war materials, afterwards in 1851, refunding this debt by issuing new bonds, the interest on which could not, however, be paid when due, on account of disturbed conditions, revolutions and internal troubles of various kinds. Finally, in 1888, a re-adjustment of the debt was arranged by issuing new gold bonds bearing 6 per cent., since which all has gone smoothly, and there has been neither default of interest nor other failure to keep obligations.

Under the terms of the "monetary reform" law which became operative 1 May 1905, Mexican coins consist of $10 and $5 gold pieces, $1.00, $0.50, $0.20 and $0.10 silver coins, $0.05 nickle coins and $0.02 and $0.01 bronze coins. Banks of issue and mortgage banks are required to have at least $500,000 capital, and agricultural, mining and industrial banks must have at least $200,000 capital. No bank can be organized until its capital is fully subscribed and until at least half is paid up. Ten per cent. of net profits must be set aside for a reserve, until such reserve equals one third or more of the capital stock. The duration of the concession under which a bank is organized cannot exceed 30 years for banks of issue, and 50 years for other banks. The total issue of notes must not exceed three times the paid up capital nor, together with deposits payable on demand or subject to withdrawal on not more than three days' notice, exceed twice the holdings of the bank in cash,— gold or silver bullion. Bank notes are not legal tender. Only notes of the denominations of $5, $10, $20, $50, $100, $500 and $1,000 can be issued. Banks are forbidden to loan or to discount notes for more than six months, to discount paper not guaranteed by at least responsible signatures, unless collateral security is given, to pledge their own notes or create any other lien on them, to mortgage their property or to pledge notes which they have discounted. Mortgage banks may make loans at simple interest, payable on fixed dates, principal to be refundable within short periods. "Banks of Promotion" may make loans for not more than two years, to mining, manufacturing, and agricultural enterprises; may guarantee paper for not more than six months, issue interest bearing treasury bonds for from three months to two years, etc. In case of a mine loan the bank must have a representative at the mine to receive the proceeds and protect the lender. In no case can these banks issue bonds exceeding their holdings in cash, bullion and realizable securities. They cannot issue bank notes, loan on real estate, issue mortgage bonds or operate in mines, metalurgical works, factories, or farms, or enter into partnership with persons in either of these lines. No bank can deal in its own shares or use them as security, nor can two or more banks consolidate without the consent of the Federal Government. An inspector is appointed by the government for each bank, who must report as to payments on account of subscriptions to its capital, examine and approve monthly cash payments, see that all statements required by the Finance Department are properly and promptly made, require proof of cash holdings and value of securities, sign all notes or securities and see that they do not exceed the amount permitted by law, certify to the cancellation and destruction of such notes or securities, keep an account of notes or securities put in circulation, be present at auctions or drawings and generally see that the law is complied with. He is forbidden to meddle with the management, to furnish information to anyone, to hold shares in, ask loans from or become in any way a debtor to the bank to which he is assigned. All banks are required to publish monthly balances showing uncalled for capital, cash holdings, amount of notes discounted, amount of collateral and mortgage loans, amount of holdings of public funds and shares or bonds immediately realizable, balance of accounts current, value of real estate holdings and of notes and other securities in circulation, amount of capital, etc. The Department of Finance publishes an annual statement showing the condition of all banks of issue. Any bank not operating under governmental authority or concession must use the words "sin concesion," (without concession), after its name.

Elisha Hollingsworth Talbot,
Author of 'Commercial and Industrial Mexico.'

14. Mexico — Army and Navy. No necessity for a large standing army or an extensive navy has existed in Mexico since the dawn of the era of peace inauguarted by President Diaz a little more than a quarter of a century ago. Rather has the attention of the government been directed toward the development of the country's commercial and industrial possibilities. Still, there has been no neglect of wise precautions against possible trouble from without or from within. A well organized War and Navy Department has been maintained, its chief executive being a member of the President's official family, and every effort that technical skill and learning, ripe experience and patriotic pride could suggest has



MANUEL GONZALES COSIO,

SECRETARY OF WAR.

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been devoted to the uplifting of the rank and file, to perfecting the esprit du corps in all departments and among all grades, to providing the most modern types of arms of every kind, to the education of suitable young men for service as officers, and generally to the good of the service in all of its many ramifications. To the writer, who has witnessed many evidences of the advance made through the past 24 years, in all these regards, its extent appears almost incredible.

Through the courtesy of a prominent official of the War and Navy Department the following statistics representing the condition of both branches of the service in October 1906 have been obtained.

The Army.—As at present organized the Army consists of: Generals of Division, 9; Generals of Brigade, 51; Brigadier Generals, 45; Jefes or Chiefs, of various grades, 697; Commissioned Officers, 2,238; Infantry, 14,697; Cavalry, 6,003; Artillery, 1,666; One Battalion of Zapadores (sappers) 568; Medical corps, 327; Construction duty, 317; Military college, (Chapultepec), 277; Military school (Tlalpam), 133; President's guard, 98; Engineers, 73; On various detail duties, 169; total number private soldiers in the army, 24,328; total number marines in navy, 1,039; horses, 5,739; mules, 2,583.

The republic is divided into 10 military zones, number one including the states of Sonora, Sinaloa and the Territory of Lower California; number two, the states of Chihuahua and Durango; number three, the states of Nuevo Leon, Tamaulipas and Coahuila; number four, Jalisco; number five, San Luis Potosi and Aguascalientes; number six, Guanajuato and Michoacan; number seven, Puebla and Guerrero; numbers eight and nine, Oaxaca; number ten, Campeche, Tabasco and the Territory of Quintana Roo. There are 28 battalions of infantry, and several parts of battalions and companies, the latter for service in the Territories of Quintana Roo and Lower California; one batallion of zapadores (sappers); a President's guard, and numerous gendarmes; 14 regiments of cavalry, and four parts of regiments, and two auxiliary corps, the latter for service in the states of Puebla and Sonora, and one squadron for service with the Geographical Exploration Commission; two regiments of mountain artillery, one regiment of horse artillery, a squadron of rapid fire cannon, etc.

The government maintains military hospitals in the cities of Guadalajara, Chihuahua, Torin, Puebla, San Luis Potosi, Santa Cruz de Bravo, Tepic, Veracruz, Monterey, and the National Capital and infirmaries in Ulua, Acapulco and Matamoros.

The National Military College, the buildings of which adjoin the castle of Chapultepec —the summer residence of the President near Mexico City— is one of the best equipped and most practical establishments of the kind on the American continent. It long ago took very high rank as a military school. The attendance of students during the fiscal year 1905–06 was 277. At the International Exposition held in Saint Louis, in 1904, a detail from this college was awarded the highest prize for proficiency—a gold medal. A school for military aspirants has recently been established at Tlalpam, a suburb of Mexico City, which is under the control of the Minister of War and Marine. The faculty is composed of carefully selected officers of the army and includes two chiefs and 14 minor officers representing the infantry, cavalry, artillery and engineering branches, and all of whom are graduates of the National Military College, of Chapultepec. The government also maintains an academy for the commissioned officers of the army, in which is given advanced theorectical and practical instruction in the topography and geography of the country, and in regard to fortifications, ordnance, military jurisprudence, etc., and schools in the various camps, in which the common soldiers are taught reading, writing, arithmetic, geometry, geography and the history of the country. To stimulate the love of study in the minds of the soldiers, money prizes ranging from $5 to $50 are given for proficiency in the various branches taught. In 1903 there were 46 of these schools, 10,015 students and 315 premiums and 37 honorable mentions were awarded, the premiums amounting to $2,615. In 1904 the number of cash premiums was 380, amounting to $3,700, and the honorable mentions numbered 153. In 1905 there were 13,052 students, 48 professors and 59 assistants, the salaries paid the latter amounting to $41,160. In the opinion of the Minister of War and Marine this educational experiment has proven to be successful in a phenomenal degree. Instruction in appropriate branches of learning is regularly given on two school ships, the "Zaragoza" and "Yucatan," and includes the advantages of an annual cruise to Mexican and United States ports. The government has recently appropriated $187,000 to the building of military barracks in the city of Guadalajara; $77,000 to the improvement of the barracks at San Luis Potosi; $271,000 for the improvement of the offices of the War and Navy Department; $206,000 for an armory; $109,000 for cavalry barracks near the city of Morelia, and a number of smaller sums for less important improvements. As rapidly as circumstances permit, the most modern arms of every description are being substituted for old patterns, and all departments of the service are being modernized so as to conform to the general advance in the science of war.

The Navy.—The Mexican Navy consists of two corvettes, the *Zaragosa* and *Yucatan;* the gunboats *Veracruz*, *Bravo* and *Morelos*, and the transport *Progreso*, for service on the Gulf of Mexico; and the gunboats *Democrata* and *Tampico* and transport *Oaxaca* for service on the Pacific Ocean. The *Zaragosa* is 213 feet in length, has a displacement of 1,226 tons and a speed of 13 knots, is built of steel, and its armament consists of six Canat guns, two Nordenfeldt rapid fire guns and two Hotchkiss revolving guns, the *Yucatan* is 279 feet in length and built of iron; the *Veracruz* is 200 feet in length, 1,000 tons displacement, has a speed of 16 miles and is built of steel. It has two Bethlehem rapid fire guns, 6 semi-automatic rapid fire guns and one Whitehead torpedo gun, the *Bravo* and *Morelos* are each 252 feet in length, have 2,500 horse power and a speed of 16 miles: they are built of steel, and each carries two Bethlehem rapid fire guns and six Schneider-Canat rapid fire guns; the *Progreso* is 230 feet in length, has 1,585 tons displacement, a speed of 12 miles, is built of steel and will carry 250 tons of cargo and 600 men, with the usual complement of officers, the *Democrata* is 138 feet in length, 450 tons displacement, 600 horse power and has a speed of ten miles, the *Tampico* is of the same dimensions, speed, armament, etc., as the Veracruz; the *Oaxaca* is 100 feet in length, its tonnage is 979, its speed 7 knots, and it was built of steel, and will carry 300 tons of cargo, 200 cattle and 500 men. Reserves are provided for service in the army in case of war, which can, if needed, be made to swell the entire fighting force to almost 500,000 men. Probably one of the most notable military organizations in the world is the mounted force known as the «Rurales,» which is distributed throughout the republic, and numbers some 150 officers and 1,200 men. It is not under the control of the War Department but of the Department of the Interior. Its members provide their own subsistence and receive much higher pay than do the regular soldiers. They wear leather uniforms, broad brimmed sombreros, ride magnificent horses, which they personally own, and are distinguished for their sturdy bravery and intelligent loyalty. They serve a somewhat similar purpose to that of the Mounted Police of the Northwest Territory of Canada.

ELISHA HOLLINGSWORTH TALBOT,
Author of Commercial and Industrial Mexico.

15. Mexico — The Mexican States. A very brief description of each of the several States and Territories of Mexico, in the order of alphabetical precedence, is here given, covering only the more notable and valuable facts in which the reader is naturally most interested:

AGUASCALIENTES.

One of the smaller States of the Republic (only Colima, Morelos and Tlaxcala are smaller), but one of the most prosperous and best equipped as to natural advantages, educational facilities, and other inducements to permanent residence. It is situated in the central «mesa,» between 21 degrees, 30 minutes and 22 degrees, 23 minutes north latitude, and 20 degrees, 40 minutes and 30 degrees, 48 minutes longitude west of the Mexican meridian. On the north, east and west, it is bounded by the State of Zacatecas, and on the south by Jalisco. It has a superficial area of 2,975 square miles. The revenues for the fiscal year 1904–05 were $191,870.98; expenses, $187,678.81. The revenues of the municipalities were $169,960.88; expenses, $175,276.77. Value of country property, $3,610,961.77; of city and village property, $3,549,490.50. Principal products: Chili peppers, $232,873; frijoles, $102,000; corn, $704,600; wheat, $80,136; peaches, $3,735; quinces, $5,562; minerals, $366,363. Value of metals smelted within the State, $22,348,119. Total value of fruits produced, $29,391, and of vegetables, $8,721. Meats consumed, $835,423. The principal cities are: Aguascalientes (the capital), (q.v.) Rincon de Romos and Tepezala. The State is divided into four departments or political divisions. Pop., 102,416.

CAMPECHE.

Situated in the southeast corner of the Republic, between 10 degrees, 49 minutes and 20 degrees, 5 minutes north latitude, and 6 degrees 38 minutes and 9 degrees, 48 minutes east longitude, meridian of Mexico. Bounded on the north by Yucatan and the Gulf of Mexico, on the east by the Territory of Quintana Roo, on the west by the Gulf of Mexico, and on the south by the Republic of Guatemala and the State of Tabasco. Area, 18,026 square miles. Principal cities: Campeche (the capital) (q.v.), Laguna and Ciudad del Carmen. Principal products in 1904: Aguardiente, $985,490; rice, $7,000; sugar, $319,852; chili pappers, $4,000; sugar cane, $69,924; chewing gum, $263,500; frijoles, $7,100; henequen, $943,187; corn, $1,768,420; molasses and syrup, $75,561; woods, $2,246,247; fruits, $94,986; vegetables, $30,657. The revenue for 1904 amounted to $82,239.34; expenses, $81,234.78. Value of country property, $9,427,890; of city and village property, $8,362,875. The State is divided into five departments. Pop., 86,542.

CHIAPAS.

Nearest State to the Meridian, being between 14 degrees, 31 minutes and 17 degrees, 57 minutes north latitude, and 4 degrees, 46 minutes and 8 degrees longitude west of the meridian of Mexico. Bounded on the north by the State of Tabasco, on the east by Tabasco and the Republic of Guatemala, on the south by the Pacific ocean and the Republic of Guatemala, and on the west by the States of Oaxaca, Veracruz and Tabasco. Area, 27,222 square miles. Principal towns: Tuxtla Gutierrez (the capital) (q.v.), San Cristobal, Comitan, Tapachula, Tonala and Soconusco. Value of country property (1904), $23,695,500; of city and village property, $3,460,456. Revenues of State in same year, $607,036.86; expenditures, $705,645.76. Principal products: aguardiente, $316,896; cotton, $4,065; indigo, $22,207; rice, $14,354; sugar, $73,915; cacao, $47,310; coffee, $1,074,597; sugar cane, $307,185; chili peppers, $12,357; frijoles, $294,826; henequen, $50,955; corn, $759,687; molasses, $254,626; pulque, $20,460; wheat, $47,937; tobacco, $10,657; woods, $174,321; fruits, $82,122; vegetables, $63,796. The State is divided into 12 departments. Pop., 360,799.

CHIHUAHUA.

The largest of the States, its superficial area being 73,191 square miles. Its northern boundary is the southern boundary of the United States; eastern, the State of Coahuila; southern, the State of Durango; and western, the States of Sinaloa and Sonora. It is divided into 10 districts and is situated between 26 degrees, 20 minutes and 31 degrees, 45 minutes north latitude and 8 degrees, 30 minutes longitude west of the Mexican meridian. Principal cities and towns: Chihuahua (the capital) (q.v.), Parral, Ciudad Juarez, Jimenez, Ciudad Guerrero, Camargo, Santa Rosalia and Bustamante. Is one of the most conspicuous States in mining, stock raising, manufacturing, and in the matter of railway facilities. Its country property was valued (1904) at $7,180,994.97; its city and town property at $9,502,-

940.15. Total revenues, same year, $941,437.50; expenditures, $880,784.21. Principal products: barley, $11,812; chili peppers, $40,842; frijoles, $334,478; corn, $1,751,304; mescal, $84,246; potatoes, $144,004; wheat, $1,006,238; tobacco, $28,131; grape wine, $7,000; woods, $493,982; fruits, $317,379, the leading articles in the order of value being peaches, apples, watermelons, oranges and pears. The value of vegetables was $27,794; minerals, $13,279,939. Value of ores treated by the smelters of the State, $10,387,816. Consumption of meat, $819,336. Several very prosperous colonies have established themselves in various parts of the State, the most notable one being composed of Mormons. Pop., 327,784.

COAHUILA.

This is also a northern border State, being bounded on the north by the Rio Bravo. Its eastern boundary is the State of Nuevo Leon, its southern, the States of San Luis Potosi and Zacatecas, and its western the States of Durango and Chihuahua. It is situated between 24 degrees, 26 minutes, and 29 degrees, 50 minutes north latitude, and 0 degrees, 37 minutes, and 4 degrees, 58 minutes longitude, west of the meridian of Mexico. Area, 62,358 square miles. There are five political districts. Principal cities and towns: Saltillo (the capital) (q.v.), Ciudad Porfirio Diaz, Monclova, Parras, Torreon and San Pedro. Value of country property (1904), $17,719,942; of city and town property, $6,229,270. Revenues, same year, $624,540.20; expenditures, $609,298.33. Principal products: grape brandy, $84,700; cotton, $11,440,084; sugar cane, $19,940; barley, $96,416; chili peppers, $54,602; frijoles, $219,794; ixtle, $452,689; corn, $2,911,601; mezcal, $605,610; molasses, $63,047; wheat, $1,010,918; wine from grapes, $1,301,440; woods, $1,103,663; fruits, $217,853, of which sum $56,582 was realized from raisins, $36,900 from pears, $23,447 from quinces and $20,082 from figs. The total value of vegetables was $50,987; of minerals, $1,064,461; of meats consumed, $1,741,991. Pop., 296,938.

COLIMA.

This Pacific coast State lies between Jalisco and Michoacan and between 18 degrees, 34 minutes, 36 seconds and 19 degrees, 26 minutes, 6 seconds north latitude, and 4 degrees, 20 minutes, 15 seconds and 5 degrees, 36 minutes, 12 seconds west longitude, of the meridian of Mexico. Its area is 2,272 square miles. There are three political districts and seven municipalities. The principal towns are: Colima (the capital) and Manzanillo. The revenues (1904) were $147,145.64; expenditures, $145,035.27. Principal products: rice, $663,407; sugar, $375,600; coffee, $26,500; sugar cane, $57,208; frijoles, $73,485; corn, $550,180; woods, $6,835; fruits, $29,483; vegetables, $4,665; consumption of meats, $335,834. Value of country property, $2,800,000; of town property, $1,500,000. Pop., about 70,000.

DURANGO.

This great State is situated between 22 degrees 53 minutes, 20 seconds and 26 degrees, 7 minutes, 30 seconds north latitude, and 3 degrees, 45 minutes and 7 degrees, 47 minutes west longitude, Mexican meridian. It is bounded on the north by the State of Chihuahua; on the east by Coahuila and Zacatecas; on the south by Zacatecas, Jalisco and the territory of Tepic, and on the west by Sinaloa. Its capital is the city of Durango (q.v.), and principal cities are Durango, C. Lerdo, Gomez Palacio, Guanacevi and Mapimi. Its area is 38,809 square miles, and it is divided into 13 politital departments. In 1904 the value of country property was $22,795,440; of city and town property, $7,548,665; its revenues were $1,085,121.57; expenditures, $1,062,315.10. Principal products: cotton, $3,661,417; sugar cane, $209,476; chili peppers, $325,928; frijoles, $323,846; ixtle, $57,816; corn, $2,618,408; wheat, $400,869; wine from grapes, $19,650; woods, $1,178,351; fruits, $291,123, the leading articles being oranges, $57,482; watermelons, $54,935; muskmelons, $46,110; peaches, $29,949; and raisins, $17,005. Vegetables produced $36,695 and minerals $11,198,968. Value of ores treated in the smelters of the State, $10,072,027. Value of cotton manufactures, $949,024.41, and of meats consumed, $1,415,090. Pop., 370,294.

GUANAJUATO.

Situated between 20 degrees, 0 minute and 21 degrees 49 minutes north latitude, and 0 degree, 31 minutes, 15 seconds and 2 degrees, 51 minutes west longitude, meridian of Mexico. Bounded on the north by the State of San Luis Potosi; on the east by Queretaro; on the south by Michoacan, and on the west by Jalisco. Area, 11,370 square miles. Leading cities and towns: Guanajuato (the capital) (q.v.), Leon, Silao, Irapuato, Acambaro, Salamanca, Penjamo, Salvatierra and San Miguel Allende. The most populous city in the State is Leon, a very important centre for many prosperous small manufacturing enterprises. For centuries the State has been one of the most important mining communities in the Republic, and recent investments of capital and energy are rapidly swelling the output. The production of minerals in 1904 was $2,226,432 and the value of ores treated by the smelters of the State was $747,596. Principal products: aguardiente, $167,064; peanuts, $45,619; sweet potatoes, $97,179; sugar cane, $48,107; barley, $183,542; chili peppers, $507,879; frijoles, $397,884; chickpeas, $340,057; corn, $6,446,936; mezcal, $33,695; molasses, $88,896; wheat, $4,755,422; tobacco, $43,867; woods, $144,979; fruits, $454,904, of which sum $108,214 was produced by watermelons, $82,849 by muskmelons, $51,811 by limes, $47,902 by peaches, $35,371 by pomegranates and $28,117 by figs. Value of meats consumed, $4,188,203. The revenues of the State were $1,275,580.83; expenditures, $1,261,153.63. The revenues of the municipalities of the State were $808,386.33; expenditures, $766,052.22. The city of Silao, which is the point on the Central railway where passengers leave the main line for the city of Guanajuato, is noted for its wonderfully even and delightful climate. Pop., 1,061,724.

GUERRERO.

Situated between 16 degrees, 10 minutes and 18 degrees, 47 minutes north latitude, and 10 degrees, 7 minutes, 30 seconds east longitude, and 3 degrees, 12 minutes, 30 seconds west longitude, Mexican meridian. Bordered on the north by the States of Michoacan, Mexico and Morelos; on the east by Puebla and Oaxaca and on the south and west by the Pacific ocean. Area, 24,995 square miles. Principal cities: Chilpancingo (the capital) (q.v.), Iguala and Acapulco. The political divisions comprise 14 districts. In 1904 the revenues were $475,986.60; the expenditures $489,132.67. Value of country property, $6,006,967; of town property, $1,083,697. The principal products were: aguardiente, $112,545; beneseed, $116,640; cotton, $107,032; rice, $51,452; sugar, $270,210; peanuts, $5,410; cacao, $7,628; coffee, $36,007; sugar cane, $48,107; chili peppers, $88,535; frijoles, $353,745; chickpeas, $39,658; ixtle, $8,283; corn, $2,647,540; mezcal, $117,631; syrup, $90,661; molasses, $247,716; tobacco, $24,855; woods, $138,893; fruits, $205,871, the principal articles being cocoanuts, $36,198; bananas, $28,801; melons, $28,625, and oranges, $23,911. Vegetables produced $24,344; minerals, $653,695. The value of ores treated by smelters was $556,711. Consumption of meats, $1,463,524. This State has been greatly retarded in material development by the lack of railway facilities, only a single line having thus far penetrated within its borders and that one only to Balsas, 107 miles south from Cuernavaca, the capital of the State of Morelos. Nevertheless, its future is regarded most favorably. Pop., 479,203.

Hidalgo.

One of the smaller States, having an area of only 8,145 square miles. Situated between 19 degrees, 31 minutes and 21 degrees, 10 minutes north latitude, 10 minutes. 9 degrees, east longitude, and 0 degree, 43 minutes west longitude, meridian of Mexico. Bounded on the north by the States of San Luis Potosi and Veracruz; on the east by Veracruz and Puebla; on the south by Tlaxcala and Mexico, and on the west by Mexico and Queretaro. The capital of the State Pachuca is only about three hours' ride by railway from Mexico City. In 1904 the revenues of the State were $1,336.601.94.; expenditures, $1,291,452.07. Value of country property, $21,792,339.94; of city and town property, $8,934,172.52. Principal products: aguardiente, $371,680; chickpeas, $49,518; coffee, $154,421; sugar cane, $64,405; barley, $887,658; chili peppers, $201,162; frijoles, $180,616; corn, $3,115,517; mezcal, $27,646; molasses, $93,431; pulque, $2,907,253; wheat, $193,454; tobacco, $101,076; woods, $301,113; fruits, $172.476, of which amount $28,761 represented bananas; $21,646, oranges; $19,964, pineapples; $15,426, nuts. Vegetables amounted to $60.158; minerals, $10,663,167. Meat consumed, $2,144.297. Value of ores treated by the smelters of the State, $6,778,264. The principal cities are Pachuca, Tulancingo and Huichapan. Pop., 605,051.

Jalisco.

One of the more important States, being first in population, and ranking very high in products, wealth, enterprise and climatic and scenic attractions. Situated between 18 degrees, 55 minutes and 23 degrees, 10 minutes north latitude, and two degrees, 20 minutes, and 6 degrees 30 minutes longitude west, meridian of Mexico. Bounded on the north by the Territory of Tepic and States of Durango, Zacatecas and Aguascalientes; on the east by Guanajuato and Michoacan; on the south by Michoacan and Colima and on the west by the Pacific ocean. Area, 31,846 square miles. Principal cities and towns: Guadalajara (the capital) (q.v.), Zapotlan, Autlan, Lagos, Ameca and Sayula. Within the boundaries of this State nestles the beautiful lake of Chapala, on the shores of which many wealthy residents of Mexico City and Guadalajara maintain elegant summer homes. The principal products of the State in 1904 were: aguardiente, $543,559; cotton, $51,122; rice, $147,461; sweet potatoes, $100,800; sugar cane, $336,151; barley, $83,427; chili peppers, $248,627; frijoles, $1,008,030; chick-peas, $499,827; ixtle, $43;202; linseed, $341,893; corn, $9,649,953; mezcal, $229,190; syrup, $74,033; molasses, $364,291; potatoes, $69,879; pulque, $70,472; wheat, $968,921; tobacco, $149,243; woods, $969,797; fruits, $677,274, of which sum $241,726 was contributed by oranges, $69,028 by bananas, $43,065 by watermelons, $40,387 by muskmelons, and $39,879 by peaches. The production of vegetables amounted to $123,104, to which onions contributed $48,800 and tomatoes $17,291. The mines of the State produced $2,172,663 and the smelters treated ores of the value of $1,418,130. The country property of the State was valued at $52,459,330 and the city and town property at $39,941,961. The consumption of meats amounted to $2,972,941. The income of the State was $1,849,441.61. Expenditures, $1,663,780.20. Pop., 1,153,891.

Mexico.

Situated between 18 degrees, 21 minutes, 30 seconds and 20 degrees, 19 minutes north latitude and between 0 degree, 44 minutes east longitude and 1 degree, 14 minutes, 30 seconds west longitude, Mexican meridian. Adjoins the State of Hidalgo on the north, Tlaxcala and Puebla on the east, Morelos and Guerrero on the south, and Michoacan and Queretaro on the west. Its superficial area is 9,245 square miles. Principal cities and towns: Toluca (the capital) (q.v.), El Oro, Cuautitlan, Amecameca, Ixtlahuaca, Lerma, Sultepec, Tenango, Tenancingo, and Texcoco. In 1904 the income of the State was $1,480,541.17; expenditures, $1,334,249.19. The income of the municipalities was $535,610.06; expenditures, $491,275.93. Value of country property, $33,298,796.63; of city and town property, $9,748,909.02. The principal products were: aguardiente, $65,498; chickpeas, $51,888; coffee, $22,179; sugar cane, $58,931; barley, $989,972; chili peppers, $47,842; frijoles, $142,108; haba beans, $211,889; corn, $4,713,027; molasses, $67,734; pulque, $7,053,606; wheat, $2,573,507; woods, $1,721,415; fruits, $253,721, to which sum cherries contributed $47,253, nuts $34,770, bananas $26,837, peaches, $24,088, and pears $23,441. Vegetables produced $105,488, garlic contributing $76,037 and onions $15,978 of this sum. The total production of minerals was $6,641,721; value of ores treated by the smelters of the State, $5,174,348. The consumption of meats amounted to $2,572,140. This State is particularly favored in the way of a market for most of its products, because of the fact that it almost surrounds the Federal District, in which is situated the Federal Capital. Pop., 934,463.

Michoacan.

Situated between 18 degrees, 6 minutes north latitude and 0 degree, 53 minutes, and 4 degrees, 30 minutes west longitude, meridian of Mexico. Bounded on the north by the States of Jalisco, Guanajuato and Queretaro, on the east by the State of Mexico, on the west by Colima and Jalisco and the Pacific ocean, and on the south by Guerrero and the Pacific ocean. Area 22,695 square miles. Principal cities and towns: Morelia (the capital) (q.v.), Patzcuaro, Uruapan, Zamora, Tacambaro, Maravatio, La Piedad, and Zitacuaro. Value of country property in 1904, $26,626,033; of city and town property, $10,131,041. Revenues, $1,418,068.57; expenditures, $1,021,879.94. Principal products: aguardiente, $242,018; beneseed, $80,170; cotton, $73,119; indigo, $28,000; rice, $494,250; sugar, $1,069,417; coffee, $44,607; sweet potatoes, $147,669; sugar cane, $195,791; barley, $230,053; chili peppers, $160,743; frijoles, $199,183; chickpeas, $216,205; haba beans, $29,700; corn, $2,483,557; syrup, $150,072; molasses, $518,606,-wheat, $2,339,820; tobacco, $63,719; woods, $379,937; fruits, $398,333 (the principal contributors to which were: watermelons, $120,733; bananas, $77,139; oranges, $46,022; muskmelons, $42,478; mangoes, $21,440); vegetables, $69,526; minerals, $3,870,525. Value of ores treated by the smelters of the State, $55,660. Consumption of meats, $3,256,586. In this State is the lake of Patzcuaro, the most beautiful ad picturesque body of water in the Republic. The most famous coffee produced on this continent is grown in and about the town of Uruapan. At the north end of the lake of Patzcuaro is the old town of Tzintzuntzan, where, in an equally old church is the most famous painting in the Republic. ‘The Entombment,’ by Titian, which is guarded as a treasure above price. The curious little town was once the capital of the Tarascan empire and had a population of at least 40,000, although now it has not more than 1,500. Pop., 935,808.

Morelos.

Situated between 18 degrees, 20 minutes, 10 seconds and 19 degrees, 7 minutes and 30 seconds north latitude, and between 0 degree, 25 minutes, 31 seconds east longitude, and 0 degree, 16 minutes, 20 seconds west longitude, Mexican meridian. Bounded by the Federal District and State of Mexico on the north; Puebla on the east; Mexico on the west, and Guerrero on the south. Area, 2,759 square miles. The principal towns are: Cuernavaca (the capital) (q.v.), and Cuautla. The income of the State for 1904 was $465,807.85; expenditure, $436,561.03. Value of country property, $7,357,995.12; of town property, $2,126,306.73. The principal products were: aguardiente, $726,931; rice, $977,414; coffee, $13,424; sugar, $3,964,331; chili peppers, $15,836; frijoles, $59,297; yucca, $452,815; corn, $1,280,474; syrup, $533,403; molasses, $283,144; woods, $822,910; fruits, $350,252; to which bananas contributed $70,732, lemons $50,700, oranges $50,193, watermelons $32,967, and muskmelons $36,951. Vegetables produced a return of $51,709. Meats consumed, $1,284,873. Cuernavaca, the capital of the State, is one of the most noted health and pleasure resorts in the Republic, and the scenery between that city and the National Capital is unexcelled. Pop., 160,115.

Nuevo Leon.

Situated between 22 degrees, 40 minutes, and 27 degrees, 51 minutes north latitude, and 0 degree, 37 minutes, east longitude, and between 2 degrees, 9 minutes west longitude, meridian of Mexico. Bounded on the north by the States of Coahuila and Tamaulipas and by the United States; on the east by Tamaulipas; on the south by Tamaulipas, San Luis Potosi and Coahuila, and on the west by Coahuila and Durango. Area, 24,317 square miles. The capital is Monterey (q.v.), and the other important towns are Linares, Lampazos and Teran. The income of the State in 1904 was $373,899.26; expenditures, $315,594.88. Value of country property, $7,753,064.88; of city and town property, $10,439,571.14. The principal products were: aguardiente, $18,000; sugar cane, $623,756; barley, $38,765; chili peppers, $20,798; frijoles, $67,832; ixtle, $441,300; corn, $1,643,863; mezcal, $133,079; molasses, $1,040,905; wheat, $30,226; woods, $212,168; fruits, $129,861, the principal ones being oranges, $49,544; aguacates, $16.667; watermelons, $14,169; peaches, $13,994, and figs $8,729. Of vegetables the product was $89,334; of minerals, $1,985,537. The value of ores treated by the smelters of the State was $19,866,658. Consumption of meat, $1,634,716. The American element in this State is quite strong and very influential in the work of development. Pop., 327,937.

Oaxaca.

Bounded on the north by the States of Puebla and Veracruz, on the east by Chiapas, on the west by Guerrero, and on the south by the Pacific ocean. Area, 35,382 square miles. Situation between 15 degrees, 16 minutes, 45 seconds and 18 degrees, 25 minutes, north latitude, and between 0 degree, 40 minutes, and 5 degrees, 11 minutes, 30 seconds east longitude, meridian of Mexico. Principal cities and towns: Oaxaca (the capital) (q.v.), Tehuantepec, Ocotlan, Salina Cruz, Tuxtepec, and Puerto Angel. The revenues in 1904 were $1,063,518.03; expenditures, $1,025,953.00. The value of country property was $13,795,392.73; of city and town property, $7,926,395.01. The principal products were: aguardiente, $353,291; cotton, $152,104; rice, $31,566; chickpeas, $66,120; sugar, $279,660; coffee, $509,676; sugar cane, $656,951; chili peppers, $61,296; frijoles, $264,355; figs, $40,121; corn, $4,413,319; mezcal, $79,169; honey, $169,353; molasses, $120,142; pulque, $36,741; wheat, $192,562; tobacco, $831,261; woods, $328,835; fruits, $312,867, of which oranges are credited with $56,632; bananas, $69,161; mangoes, $29,434; watermelons, $26,121, and cocoanuts, $24,208. The production of vegetables amounted to $42,052; of minerals, to $526,968. The value of ores treated was

$347,523. Consumption of meats, $2,766,949. Pop., 948,633.

PUEBLA.

Surrounded by the States of Hidalgo, Veracruz, Oaxaca, Guerrero, Morelos, Mexico, and Tlaxcala. Area, 12,204 square miles. Contains 21 districts or political divisions. The capital, which bears the same name as the State, is the third city in population and commercial importance in the Republic. It is the centre of a very extensive cotton manufacturing district. The principal products in 1904 were: aguardiente, $557,321; rice, $100,000; chickpeas, $70,798; coffee, $297,864; sugar cane, $1,209,979; barley, $1,024,791; rye, $80,400; chili peppers, $240,250; frijoles, $624,046; haba beans, $212,286; corn, $5,300,527; syrup, $108,795; molasses, $306,773; potatoes, $318,570; pulque, $477,846; wheat. $2,532,768; fruits, $455,331; to which sum bananas contributed $58,111; oranges, $52,128; cherries, $34,292; apples, $28,142; mamey, $29,236, and aguacates. $26,442. The production of vegetables amounted to $212,835, to which sum tomatoes alone contributed $142,178. The return of mineral products was $2,085,335. and the value of ores treated by local smelters, $3,307,349. Meats consumed, $4,494,790. The revenues of the State in 1904 amounted to $1,377,078.88; expenditures, $1,369,071.41. Value of country property, $25,549,886.59; of city and town property, $37,100,873.20. Meats consumed, $4,494,790. Value of cotton goods manufactured, $9,897,973.51. There are 32 cotton mills in the State, 147,000 spindles, 4,807 looms and 5,200 operatives. The principal towns are: Puebla (the capital), (q.v.), San Andres, Tehuacan, Acatlan, San Marcos, Cholula, Atlixco and Zacatlan. Pop., 1,021,133.

QUERETARO.

The boundaries of this State are San Luis Potosi on the north, Hidalgo and Mexico on the east, Michoacan on the south, and Guanajuato on the west. Situated between 19 degrees, 26 minutes, and 21 degrees, 36 minutes north latitude, and between 0 degree, 1 minute and 1 degree, 29 minutes, 30 seconds west longitude, meridian of Mexico. Area, 3,557 square miles. Principal cities and towns: Queretaro (the capital) (q.v.) and San Juan del Rio. There are six departments or political divisions. In 1904 the total revenues of the State were: $352,149.59; expenditures, $359,053.81. Value of country property, $11,180,035.72; of city and town property, $4,121,474.50. Principal products: aguardiente, $14,915; sugar cane, $36,725; barley, $56,204; chili peppers, $35,871; frijoles, $901,577; chickpeas, $95,216; corn, $2,350,258; pulque, $67,128; wheat, $1,117,522; woods, $719,795; fruits, $69,712, of which amount aguacates contributed $35,907. The production of vegetables was $18,013. Meats consumed, $458,452. Value of cotton goods manufactured, $2,505,965.58. It was at the capital city of this state that Maximillian and two of his leading generals were executed. Pop., 232,389.

SAN LUIS POTOSI.

The irregular shape of this very important State is such that its boundaries include part of the lines of the nine States of Coahuila, Nuevo Leon, Tamaulipas, Veracruz, Hidalgo, Queretaro, Guanajuato, Jalisco and Zacatecas. It is divided into 13 districts, has an area of 25,316 square miles, and a population, (census 1900), of 575,432. Its principal cities and towns are: San Luis Potosi, (the capital) (q.v.), Catorce, Matehuala and Rio Verde. Revenues in 1904, $1,005,949.87, and expenditures $1,002,669.71, and the value of country property, $17,492,794.22 and of city and town property, $11,545,703.65. Principal products: aguardiente, $210,593; peanuts, $300,925; coffee, $416,208; sugar cane, $47,096; barley, $69,092; chili peppers, $144,041; frijoles, $404,343; ixtle, $444,869; corn, $6,700,631; mezcal, $207,736; molasses, $534,414; pulque, $86,130; wheat, $76,343; tobacco, $19,607; woods, $309,121; fruits, $237,332, chief among which were prickly pears, $58,560; oranges, $53,932; aguacates, $21,505; mangoes, $18,657; limes, $11,652; apples, $10,256 and bananas, $10,673; the production of vegetables amounted to $24,340, and of minerals to $4,591,399. Value of ores treated by the smelters of the State, $8,742,986. Consumption of meats, $1,980,114. Value of cotton goods manufactured, $122,464.62. Number of cigarettes manufactured, 17,552,674 and of cigars, 13,431,609. Pop., 575,432.

SINALOA.

Situated between 22 degrees, 33 minutes, and 28 degrees, north latitude and between 6 degrees, 19 minutes and 10 degrees, 35 minutes west longitude, Mexican meridian. Bounded on the north by the State of Sonora; on the east by Chihuahua and Durango; on the south by the territory of Tepic and on the west by the Gulf of California. Area, 33,671 square miles. Principal towns: Culiacan (the capital), Mazatlan, Fuerte and Rosario. There are 10 districts or political divisions. The revenues of the State in 1904 were $559,969.54; the expenditures, $556,988.94. Value of country property, $7,489,707.32; of town property, $6,399,681.57. Principal products: aguardiente, $134,000; cotton, $32,840; sugar cane, $1,059,110; frijoles, $140,076; chick-peas, $52,320; ixtle, $39,515; corn, $1,009,356; mezcal, $171,049; syrup, $214,100; molasses, $114,126; wheat, $67,600; tobacco, $35,276; woods, $214,574; fruits, $173,765, of which amount watermelons contributed $40,720; bananas, $29,639; mangoes, $26,209; oranges, $19,673 and muskmelons, $18,760. Vegetables, $95,451. Minerals, $5,948,352. Value of ores treated by the smelters of the State, $4,885,089. Consumption of meats, $1,309,407. Value of cotton goods manufactured, $68,578. This is one of the Pacific coast States now being rapidly developed through the investment of immense sums of money in railway building, mining and agriculture. Pop., 290,761.

SONORA.

The most northwesterly State of the Republic. Situated between 26 degrees, 20 minutes, and 32 degrees, 29 minutes, 44 seconds, north latitude, and 0 degree, 15 minutes, 55 seconds, longitude west of meridian of Mexico. Area, 76,900 square miles. Principal towns: Hermosillo (the capital) (q.v.), Guaymas, Cananea, Nogales, Naco, Alamos and Agua Prieta.

The State is bounded on the north by the United States; on the east by the State of Chihuahua; on the south by Sinaloa, and on the west by the Gulf of California and the Territory of Lower California. It is divided into nine districts. Revenues in 1904, $768,043.26; expenditures, $609,380.21. Principal products: cotton, $24,600; chick-peas, $268,128; sugar cane, $47,935; barley, $45,647; chili peppers, $43,063; frijoles, $324,912; corn, $1,367,101; mezcal, $148,400; molasses, $56,014; potatoes, $46,291; wheat, $1,232,022; tobacco, $55,290; woods, fruits and vegetables not reported; minerals, $15,839,980 and value of ores treated by smelters of the State, $9,516,058. The consumption of meats amounted to $2,239,365. Value of cotton goods manufactures, $353,356.40. Number of cigarettes manufactured, 2,929,440. The greatest mining State of the Republic, leading the next highest State (Chihuahua) by $2,560,041. Pop., 221,682.

TABASCO.

Situated in the southeastern part of the Republic, between 16 degrees, 5 minutes, and 18 degrees, 39 minutes north latitude, and between 5 degrees 11 minutes, and 8 degrees, 10 minutes longitude, east of the meridian of Mexico. Bounded on the north by the Gulf of Mexico; on the east by the State of Campeche and the Republic of Guatemala; on the south by the State of Chiapas and the Republic of Guatemala, and on the west by the State of Veracruz. Area, 10,072 square miles. There are 17 municipalities in the State. The principal towns are: San Juan Bautista (the capital) (q.v.), Frontera and Tonala. Value of country property in 1904: $8,184,368.89; of town property, $5,334,594.44. Revenues, $564,345.02; expenditures, $503,265.01. Principal products: aguardiente, $400,632; rice, $165,355; sugar, $100,900; cacao, $1,137,991; coffee, $71,410; sugar cane, $77,160; chewing gum, $34,562; frijoles, $289,987; gum elastic, $104,855; corn, $720,800; syrup, $36,206; molasses, $16,824; tobacco, $40,842; woods, $242,512; fruits, $40,778; vegetables, $17,163; meats consumed, $932,916. Pop., 159,834.

TAMAULIPAS.

One of the least developed of the Mexican States. Situated between 24 degrees, 14 minutes and 27 degrees, 38 minutes, 15 seconds north latitude, and between 2 degrees east longitude and 1 degree, 15 minutes west longitude, meridian of Mexico. Bounded on the north by the United States; on the east by the Gulf of Mexico; on the south by the States of Veracruz and San Luis Potosi, and on the west by Nuevo Leon. Area, 32,576 square miles. Principal towns: Victoria (the capital) (q.v.), Tampico, Matamoros, New Laredo and Ciudad Guerrero. Income in 1904 $314,420.97; expenditures, $301,240.27. Value of country property, $9,361,860.25; of town property, $8,722,965.57. Principal products: aguardiente, $85,250; cotton, $99,873; rice, $38,742; sugar cane, $76,656; barley, $372,900; frijoles, $212,358; corn, $1,393,606; syrup, $40,912; molasses, $220,919; fruits, vegetables and woods not reported; minerals, $368,505; meats consumed, $733,898. Pop., 218,948.

TLAXCALA.

The smallest of the Mexican States, having an area of only 1,595 square miles. Lies between 19 degrees, 5 minutes, and 19 degrees, 43 minutes, north latitude, and from 0 degree, 28 minutes, 30 seconds, to 1 degree, 28 minutes, 15 seconds east longitude, meridian of Mexico. Bounded on the north by the States of Hidalgo and Puebla; on the east and south by Puebla and Mexico, and on the west by Puebla. The State is divided into six districts. Principal towns: Tlaxcala (the capital) (q.v.), Tlaxco and Alzayanca. In the year 1904 the revenues of the State were $377,654.43; expenditures, $334,279.03. Value of country property, $8,113,497.94; of town property, $881,703.33. Value of cotton goods manufactured, $2,331,631.93. The little State is the center of very important manufacturing, dairy and agricultural interests generally. Neither agricultural, fruit, vegetable nor wood products were reported for 1904. In the town of Tlaxcala stands the first church from which a Christian sermon was preached on the American continent. The pulpit from which this sermon was preached is still carefully preserved. Pop. 172,315.

VERACRUZ.

Situated between 17 degrees, 10 minutes, 30 seconds and 22 degrees, 19 minutes, 25 seconds, north latitude, and between 0 degree, 28 minutes, and 5 degrees, 30 minutes, east longitude, meridian of Mexico. Bounded on the east by the Gulf of Mexico; on the north by Tamaulipas; on the west by Puebla, Hidalgo, Oaxaca and San Luis Potisi, and on the south by Chiapas and Oaxaca. Principal cities and towns: Veracruz, Orizaba, Xalapa (the capital) (q.v.), Cordova, Papantla, Coatepec, Coatzacoalcos, Minatitlan, San Andres Tuxtla, Tlacotalpan and Tuxpam. Value of country property in 1904, $62,651,716.17; of city and town property, $61,729,467.47. The State revenues were $1,350,992.91; expenditures, $1,168,297.85. The revenues of the municipalities were, $2,385,700.65; expenditures, $2,352,656.10. The principal products of the State in the same year were: Aguardiente, $5,401,814; cotton, $81,426; rice, $398,127; chick-peas, $49,683; sugar, $6,469,359; coffee, $10,492,682; sugar cane, $6,366,077; barley, $482,357; chili peppers, $1,428,385; chewing gum, $576,939; frijoles, $1,960,897; haba beans, $34,465; gum elastic, $171,800; corn, $14,728,187; honey, $230,386; syrup, $1,838,205; molasses, $288,788; potatoes, $97,771; pulque, $68,688; wheat, $338,964; tobacco, $3,245,430; woods, $1,499,809; fruits, $1,875,730, to which enormous sum bananas contributed $666,920; oranges, $357,678; aguacates, $130,536; mangoes, $222,646; pineapples, $104,777; watermelons, $89,642; limes, $49,893; prunes, $24,855; peaches, $24,091; and cocoanuts, $23,814. Vegetables produced, $203,415, of which sum pumpkins supplied $72,423; cabbages, $49,797, and tomatoes, $22,864. Meats consumed, $6,112,569. Value of cotton goods manufactured, $10,276,335.71. Number of spindles, 108,697, and of looms, 4,244. Number of operatives in cotton mills, 5,390. There were manufactured in the same year 20,040,725 cigarettes and 33,313,056 cigars. There has recently been spent in improvements on the harbor alone

$26,000,000. Area, 29,201 square miles. Pop., 981,030.

YUCATAN.

The most southeasterly and in respect to its ancient history, one of the most interesting States of the republic. Situated between 17 degrees, 40 minutes and 21 degrees, 35 minutes north latitude, and between 8 degrees, 39 minutes, and 12 degrees, 12 minutes east longitude, meridian of Mexico. Bounded on the north by the Gulf of Mexico; on the east by the Territory of Quintana Roo; on the south by the Territory of Quintana Roo and the State of Campeche, and on the west by the State of Campeche. Area, 35,204 square miles. Principal cities and towns: Merida (the capital) (q.v.), Progreso, Peto, Ticul, Uxmal and Izamal. The revenues of the State in 1904 were $3,507,679.92; the expenditures, $857,033.92. Value of country property, $15,071,017.39; of city and town property, $14,786,169.44. Principal products: aguardiente, $223,000; henequen, $30,982,487; corn, $746,281; honey $51,500; woods not reported; fruits, $287,979, the principal ones being oranges, $107,960; aguacates, $29,700, watermelons, $19,300; bananas, $17,400; limes, $15,408 and lemons, $12,740. The value of vegetables produced was $37,205. Consumption of meat, $5,456,530. Pop., 309,652.

ZACATECAS.

One of the oldest and best known mining States of Mexico. Situated between 21 degrees, 9 minutes, and 24 degrees, 53 minutes, 50 seconds north latitude, and between 20 degrees, 7 minutes, 40 seconds and 5 degrees, 20 minutes, west longitude, meridian of Mexico. Area, 24,757 square miles. Bounded on the north by the State of Coahuila; on the east by San Luis Potosi, on the south by Aguascalientes and Jalisco, and on the west by Durango and the Territory of Tepic. Principal cities and towns: Zacatecas (the capital) (q.v.), Jerez, Sombrerete, Fresnillo, and Pinos. The revenues in 1904 were: $790,048.12; expenditures, $828,633.04; value of country property, $18,060,181.30; of city and town property, $9,578,909.97. Principal products, sugar cane, $245,159; barley, $91,783; chili peppers, $73,147; frijoles, $179,941; corn, $2,462,578; molasses, $244,285; wheat, $256,742; woods, $154,433; fruits, $106,852; chief among which were apples, $64,113; oranges, $21,802; peaches, $17,042; pears, $16,808; raisins, $11,686; prickly pears, $11,119 and quinces, $9,620. Vegetables gave a return of $23,593. The total value of minerals produced was $5,050,543 and value of ores treated, $3,486,746. Meats consumed, $1,021,794. Pop., 462,190.

TERRITORIES.

LOWER CALIFORNIA.

This is the largest of the Mexican territories, having an area of 58,328 square miles. It is bounded on the north by the United States; on the east by the State of Sonora and the Gulf of California, and on the south and west by the Pacific ocean. It lies between 22 degrees, 35 minutes, and 32 degrees, 42 minutes, north latitude, and between 10 degrees and 18 degrees, west longitude, meridan of Mexico. The capital of the northern district is Ensenada and of the southern district, La Paz. The other leading chief towns are: Santa Rosalia and Mulgé. The income of the Territory in 1904, was $103,017.81; expenditures, $104,108.28; value of country property, $3,916,800.69; of town property, $1,407,922.72. Principal products: cotton, $5,300; sugar cane, $68,080; frijoles, $17,040; corn, $33,400; syrup, $135,650; molasses, $145,850; fruit, $12,000; wine from grapes, $16,600; woods, $61,238; fruits, $99,880, to which sum raisins contributed, $47,550; figs, $30,225 and watermelons, $10,120. Vegetables produced, $7,065 and minerals, $1,835,628. The value of ores treated was $570,761; of meats consumed, $482,359. Pop., 47,624.

QUINTANA ROO.

This newest, least known and least developed of the three Mexican territories is situated in the southeast corner of the Republic. It is bounded on the north by the State of Yucatan and the Gulf of Mexico; on the east by the Sea of the Antilles; on the south by Belice and the Republic of Guatemala, and on the west by the states of Yucatan and Campeche. It may be considered a military possession, inasmuch as it seems to have been given territorial existence in order that the Federal Government might more effectively handle the unruly Indians of the region,— part of the State of Yucatan,— who were the last in the Republic to be brought under control. It is governed by the military, and a military railway, which was built by the army, and is 35 miles long, connects the towns of Vigia Chico and Santa Cruz de Bravo, the latter being the capital of the Territory. There appears to be no official record of the population or products of the Territory, nor of its dimensions. In fact it appears to be still included in the State of Yucatan in so far as these details are concerned.

TEPIC.

This territory formerly belonged to the State of Jalisco and was known as the "Ancient Seventh Canton." It is situated between 19 degrees, 45 minutes, and 22 degrees, 45 minutes, north latitude, and between 4 degrees, 47 minutes and 6 degrees, 40 minutes, west longitude, meridian of Mexico. Area, 11,275 square miles. Bounded on the north by the States of Sinaloa and Durango; on the east and south, by Jalisco, and on the west by the Pacific Ocean. Principal towns: Tepic (the capital), Ixtlan, Sayula, San Blas and Acaponeta. There are 16 departments or political divisions. Principal products: aguardiente, $101,603; cotton, $43,293; rice, $144,045; sugar, $252,570; coffee, $235,202; sugar cane, $77,108; chili peppers, $31,072; frijoles, $222,114; corn, $990,059; molasses, $68,043; tobacco, $332,830; woods, $509,356; fruits, $148,991, the principal ones being bananas, $48,563; apples, $22,463; oranges, $20,952, and watermelons, $11,456. Vegetables, $46,272. The production of minerals reached the large sum of $5,943,328 and the value of ores treated, $1,469,560. Meats consumed, $604,080. Value of cotton goods manufactured, $378,306.73. Number of cigarettes manufactured, 5,545,670; of cigars, 3,821,591. Pop., 150,098.

FEDERAL DISTRICT.

This area of only 461 square miles includes within its boundaries the national capital and a large number of near by villages and towns, and has a population of not less than 650,000. In 1904 the real estate of the District,— country, city and village,— was valued by the National Government at $252,716,454.29. Its actual value at the present time may be reasonably placed at not less than $400,000,000; some authorities estimate it above $500,000,000. The northern, eastern and western boundaries are supplied by the State of Mexico, and the southern boundary by the State of Morelos. Geographically, the Federal District is situated between 19 degrees, 26 minutes, 12 seconds north latitude, and 99 degrees, 6 minutes, 42 seconds, east longitude. Meridian of Greenwich; 101 degrees, 27 minutes, 18 seconds east longitude, of the meridian of Paris, and 22 degrees, 4 minutes, 9 seconds west longitude, of the Meridian of Washington. Elevation, 7,344 feet above sea level. The principal products in 1904, were: aguardiente, $696,108; barley, $11,812; chili peppers, $40,842; frijoles, $33,834; haba beans, $18,086; corn $668,815; pulque, $221,056; wheat, $99,869; fruits, $18,987; vegetables, $88,457. In the same year there were manufactured 210,156,645 cigarettes; 49,751,025 cigars, and cotton goods to the value of $5,714,503.45. The consumption of meats amounted to $8,075,461.

ALBINO R. NUNCIO,
Commissioner of Mexico to the Pan-American Exposition, Buffalo, N. Y., 1901; *Chief of the Second Bureau of the Department of Public Promotion, Mexico.*

Mexico, City of, capital of the Republic of Mexico and chief city of the Federal District, is situated in lat. 19° 26′ 5″ N., lon. 99° 6′ 45″ west from Greenwich, at an altitude of 7,434 feet above the level of the sea, near the centre of the Valley of Mexico. This is a marshy table-land, about 60 miles long, 30 miles wide and enclosed at all points by high mountains. The climate of the city is mild. The temperature ranges from 35° to 90° F., but it seldom falls below 60° or rises above 80° (in the shade), the mean being between 60° and 70°. The nights and mornings are cool throughout the year, the hottest months being April and May.

Topography and Streets.— It has an area of more than 20 square miles. Its population (census of 1900) was nearly 370,000. It is the largest and finest city of Latin America; at the beginning of the 19th century the largest city in the Western hemisphere, «the handsomest capital in America,» said Humboldt at that time. It is the political, the commercial, the educational centre of the republic, indeed the centre of every line of national activity. It is to Mexico, it has been said, what Paris is to France. It is distant by rail from: Vera Cruz, on the Gulf of Mexico, 263 miles; Acapulco, on the Pacific, 290 miles; El Paso, Texas, 1,224 miles. Its streets, of which with lanes there are more than 900, are straight, extending from north to south, and east to west, and intersecting at right angles. The city is growing chiefly toward the southwest, but in this new section, the streets are not laid out as regularly as in the old. The principal ones are broad, well paved with asphalt, well kept, and bordered with good sidewalks. Square, flat-roofed buildings of two or three stories, built round a *patio* (court yard) open to the sky, line the streets. Their walls are thick, of stone or brick, generally covered with stucco. The windows open on to neat little balconies. Some of the finest buildings are faced with porcelain tiles of different colors, arranged in beautiful patterns; their patios being adorned with pretty gardens, fountains, and statuary. Owing to the marshy soil none of the buildings have cellars, and because of the possibility of earthquakes and the mildness of the climate all, in the old part of the city at least, have no chimneys. For cooking, charcoal is used in *braseros* (brick stoves). The street nomenclature is peculiar. A continuous line of street generally has a different name at every block. In 1889 the streets were re-named. All extending east and west were named *avenidas;* all north and south *calles* (streets), one name being given to a continuous thoroughfare. But the people, especially the uneducated classes, clung so tenaciously to the old names that the authorities yielded and the former names were restored. There is no exclusively residential section, one of the handsomest residences often being found between two business houses in the heart of the city. The principal business street is named Los Plateros (the silversmiths) for two blocks, and San Francisco for the next three. It is also the most fashionable shopping street. Next in importance to Los Plateros is Calle Cinco de Mayo (Street of 5th of May), the name commemorating the repulse of the French by the Mexicans at Puebla in 1862. Both these streets start from the main square. Some of the streets are named for distinguished men of Mexican history. Others have religious names, taken from names of churches situated thereon, as Street of Holy Ghost, Jesus, Sanctified Virgin, and the like. Still others have very odd names, as Lost Child, Sorrow, Sad Indian. The street car service, owned and operated by English capitalists, is excellent. A system of electric traction covers the entire city and connects all the suburban towns. In 1902 these lines carried 30,000,000 passengers. Hearses are almost unknown, special street cars being used to convey to the cemetery both the dead and mourners.

Parks and Public Buildings.— The principal square is the Plaza Mayor de la Constitucion, situated in the centre of the city. It covers 14 acres, but is only part of the ground enclosed by the walls of the *teocalli* (temple) of the ancient Aztec city. Its centre is occupied by a park named the Zocalo. The entire eastern side of the plaza is bounded by the National Palace, which is said to occupy the site of Montezuma's palace. The present building was begun in 1692 and has been added to from time to time till now it has a frontage of nearly 700 feet. It is two stories high and architecturally the least attractive public building in the city, being long, low, and monotonously plain. Originally it was the residence of the rulers of Mexico, but for many years has been devoted to housing some of the executive departments of the national government, including the President's offices. The federal senate meets here temporarily until the magnificent federal capitol, which is under construction, shall have been erected. On the second floor and extending the length of nearly the entire front is the Hall of Ambassadors, with its walls hung with portraits of Mexican rulers since independence was won, besides a full-length likeness of Washington. Over the main entrance hangs the Liberty Bell, with which, in his church at Dolores, the father of Mexican independence, the priest Hidalgo, called his people to arms on the night of 15 Sept. 1810. It was moved to its present location in 1896, and since, a feature of every celebration of the anniversary of the declaration of independence is the ringing of this bell at midnight by the President. On the north side of the Plaza Mayor is the cathedral, the city's chief architectural feature, its most majestic, most imposing edifice. It occupies a part of the ground enclosed by the walls of the ancient Aztec temple. It covers a greater area than any other church in the Western hemisphere, and is surpassed in this respect by only two in the whole world — St. Peter's at Rome and the Spanish cathedral at Seville. The walls are gray stone. From the sides of the façade rise two bell towers. The whole pile is crowned by a central tower which commands a superb view of the city and the surrounding valley. It was begun in the last half of the 16th century and more than two centuries elapsed before it was entirely finished. Altogether, both outside and in, it has cost many millions. The railing of the choir is made of a composite of gold, silver, and copper and is said to have cost $1,500,000. The interior contains also some exquisite wood carving and some excellent paintings, the best being one by Murillo, in the chapter-house. In this cathedral in 1822 Agustin Iturbide was crowned Emperor of Mexico, and here he is buried, his coffin bearing simply these words: «The Liberator.» Here too in 1864 the Austrian archduke Maximilian and his wife

CATHEDRAL IN THE CITY OF MEXICO.

Univ. Library, UC Santa Cruz 2001

Carlotta were crowned emperor and empress of Mexico. Other churches especially noteworthy are Profesa, one of the most beautiful; Santo Domingo, one of the largest; San Hipolito, and San Francisco, the most interesting historically. In the latter of the last two Cortes worshipped and for many years lay buried. Here Iturbide attended the celebration of Mexican independence and here was held his funeral.

To the rear of the National Palace is the National Museum, containing a large and very valuable collection of Mexican antiquities, as well as many treasures identified with the nation's history from the earliest down to recent times. Some of the most valuable archæological remains have been found a few feet below the surface while excavating within the grounds which were once enclosed by the walls of the Aztec temple. The most important of these treasures are the Sacrificial Stone, the Aztec Idol of War and Death, and the Stone of the Sun. The last is often erroneously called the Calendar Stone; the archæologist, A. F. Bandelier, says it was undoubtedly used for sacrificial purposes. Besides these there is an almost endless array of small stone specimens, as well as tools, arms, weapons, picture-writing and feather work. In the section of national history is the banner borne by Hidalgo during his struggle for the independence of the colony, the standard belonging to Cortes, and carried through the period of the Conquest, and Maximilian's silver table-service and coach of state.

Near the National Palace is the National Academy and School of the Fine Arts, founded in 1778. It attracted the favorable notice of Humboldt during the year he spent in the city at the beginning of the 19th century. Its collection of casts, he said, was better than any to be found in Germany. It contains paintings ascribed to Murillo, Rubens, Velasquez, Leonardo, but its greatest work, the one pronounced by distinguished art critics one of the great paintings of the world, represents the Spanish priest and historian, Las Casas, protecting the Aztecs. It is the work of a native artist and received the first prize in the Academy of Rome. The Academy receives from the government an annual allowance of $35,000. A large part of this sum is spent in prizes. The one which is most eagerly competed for being the one which enables the recipient to study art in Italy — a prize of $600 a year for six successive years. In the day and night school connected with the Academy the tuition is free.

The National Library is housed in a fine building, once the Church of Saint Augustin, which like other religious foundations, in 1859 when the Laws of Reform took effect, became the property of the state. Portrait busts of distinguished Mexicans ornament the fence enclosing the gardens at the sides. Along the walls of the interior are ranged statues of the greatest men in literature of all times and places. The library contains more than 225,000 volumes. When the monasteries were suppressed, their libraries were gathered here and the collection therefore is especially rich in eccelesiastical literature. In 1537 the first book printed in the New World was printed in the City of Mexico on a printing-press brought from Spain. Its title: 'Escala Espiritual para Llegar al Cielo' (Spiritual Ladder for Reaching Heaven). No copy of this work remains, the oldest work extant being a history of Tenochtitlan (Mexico) published in 1543. In this city was printed the first music printed in the New World, the first engravings from wood, the first newspaper, 'Mercurio Volante' (Flying Mercury), and antedating the first paper in the American colonies by more than ten years. Besides the National there are several small libraries with collections ranging in size from 7,000 to 14,000 volumes. The national archives are stored in the National Palace.

The largest and most beautiful park and public garden is the Alameda, situated about half a mile west of the Plaza Mayor, and bounded on the south by the Avenida Juarez. It covers about 40 acres, which include the lot wherein the victims of the Inquisition were burned. It is intersected by pleasant walks, shaded by fine trees, adorned with flower beds, flowering shrubs, and fountains. Concerts, attended by all classes, are given here every Sunday afternoon. A very short distance from the Alameda, the Avenida Juarez opens into the Paseo de la Reforma, one of the most beautiful avenues in the world. It was designed by Maximilian, who named it the Boulevarde Emperiale. It is the fashionable afternoon drive and promenade. Broad at first, it has recently been enlarged to twice its original width. It is over two miles long and is lined on each side by double rows of lofty trees, beneath which are foot-ways and at their sides stone benches. Starting at the equestrian statue of Charles IV. of Spain it expands at regular intervals into *glorietas* (circles), some of which are adorned with monuments of the greatest men in Mexican history. This statue of Charles IV. is one of the city's finest works of art. Humboldt said that next to the equestrian statue of Marcus Aurelius at Rome, it was the best work of its kind in the world. It was made in Mexico at the beginning of the 19th century, it being the first important piece of bronze cast in America. At another circle is a statue of Columbus, and still further on one of Guatemotzin, the last of the Aztec kings.

The Paseo extends to the gates of Chapultepec, a rocky height rising abruptly from the level of the surrounding plain. A beautiful park, set with gigantic cypresses, which are said to antedate the Spanish Conquest, encircles the base of the rock. A palace crowns the hill, a part of which is occupied as the summer home of the President, the rest being used by the National Military Academy. Back of the hill is the battle field of Molino del Rey. The view from the front is regarded one of the most beautiful in the whole world,— the long vista of the Paseo de la Reforma to the city, standing in the centre of the valley, encircled by high mountains from which rise the snow-capped peaks, Ixtaccihuatl and Popocatepetl, 16,060 and 17,782 feet respectively above the level of the sea. In the park at the base of the rock there is a monument to the Mexican cadets who fell in 1847 while defending the hill from the assault of the American army. As evidence of the mutually good feeling existing between the local population and the American residents, on each American Memorial Day, the latter place flowers on this monument while the former do the same to the graves in the cemetery of the American soldiers who died during the American invasion.

The chief suburbs are: Tacubaya, San Angel, Coyoacan, Popotla, Guadalupe, and the towns along the line of the Viga Canal. All are within a radius of eight miles of the centre of the city. The Viga Canal is about eight miles long and connects the city with lakes Xochimilco and Chalco. From the gardens along this waterway come the flat-bottomed boats loaded with vegetables, fruits, and flowers for the city market. On Sundays and feast-days it often presents a very lively and picturesque sight, covered with boat-loads of people on their way to the picnic grounds of Santa Anita, a little Indian village of straw-thatched huts. Surrounding it are the *chinampas* (floating gardens). That they once floated is doubtful; at all events they are stationary now and are mere patches of marshy ground intersected by narrow channels, and used as market gardens. At Ixtacalco are other floating gardens. A road, the Paseo de la Viga, borders one side of the canal. Guadalupe contains the shrine of the Virgin of Guadalupe, the patron saint of Mexico. Here the treaty of peace, following the war of 1847 with the United States, was signed. At Popotla is the famous tree, L'Arbol de la Noche Triste (the tree of the dismal night), beneath which Cortes is said to have sat and wept the night of 1 July 1520, after his expulsion from the city. Coyoacan is even older than the City of Mexico. Cortes made it the seat of government while he superintended the rebuilding of the conquered city. The house in which he lived is still standing. San Angel is a beautiful little town, well known, too, for its excellent fruits, flowers, and vegetables. At Tacubaya is the national astronomical observatory. It contains also many very pretty houses where the wealthy residents of the capital pass the summer.

Commerce and Industry.— The city is the commercial and industrial centre of the republic. It possesses several wealthy banking institutions, the largest being the National Bank of Mexico with a capital of $32,000,000.

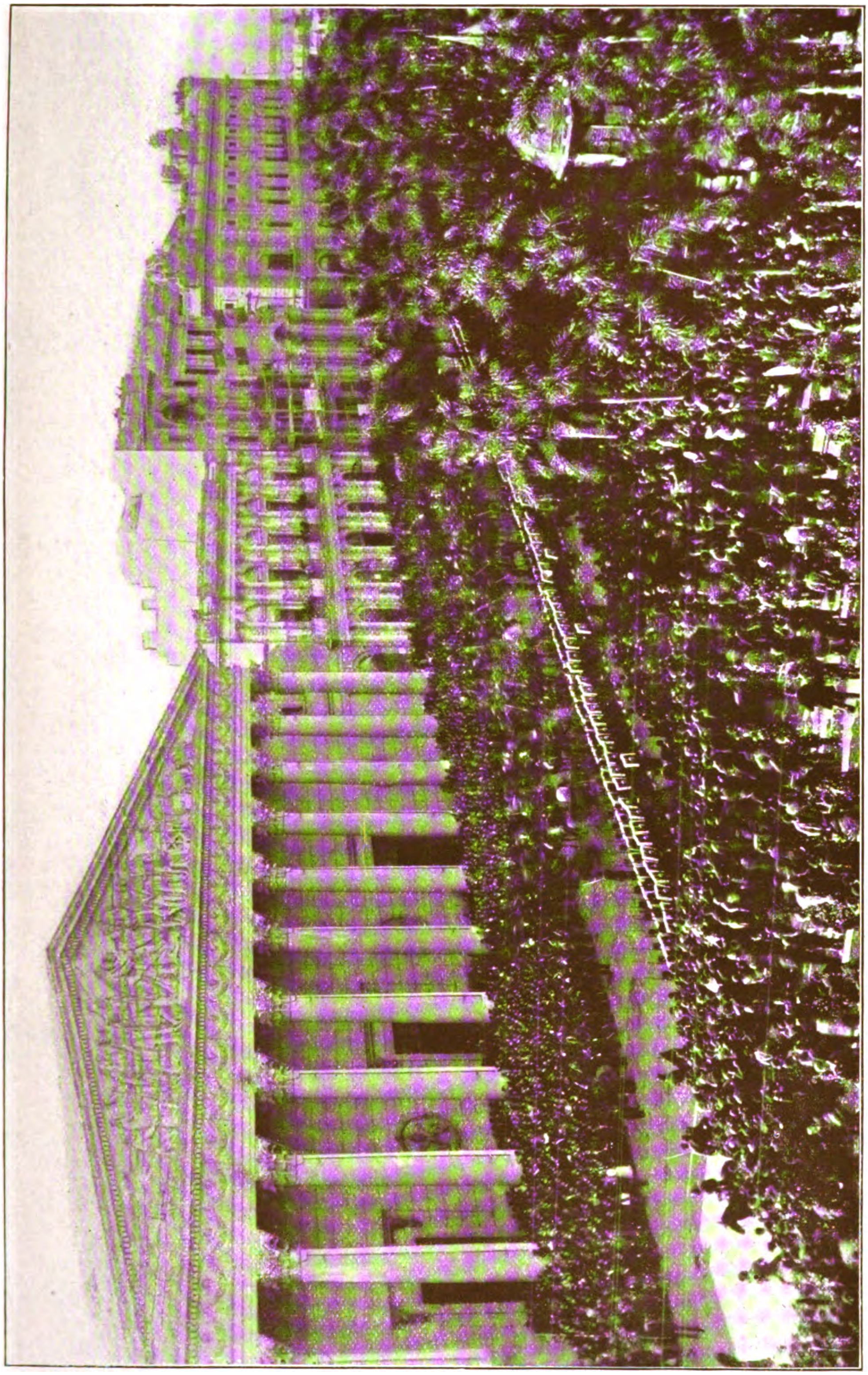
It had in 1903 several hundred factories, including corn, flour, paper, and coffee mills; iron and type foundries; manufactories of cigars, hats, furniture, glass, pottery, rope, wire, starch, glue, soap, musical instruments, and many others. Dun's Agency for February 1903, states that dry goods' dealers report that 60 per cent of the goods sold are of domestic manufacture.

Transportation.— The railways which centre in the City of Mexico are: The Mexican Central, which runs almost due north to El Paso, Texas, 1,224 miles; The Mexican, the first completed line in Mexico, extending to Vera Cruz, 263 miles; the Cuernavaca Division of the Mexican Central, extending to Cuernavaca, and Rio de las Balsas, with ultimate terminus at Acapulco; the Interoceanic, extending to Vera Cruz; the National, extending to Laredo, Texas, 840 miles.

Municipal Administration.— The Palacio del Ayuntamiento (city hall) is situated at the south side of the Plaza Mayor. The present building dates from 1720. In its council chamber are portraits of all the governors of Mexico from Cortes. The government of the city from the beginning, for nearly 400 years, till the end of June 1903, had been vested in a city council, composed of aldermen, a mayor, and a governor of the Federal District. On 1 July the new law, creating a change in the form of government became operative. The Federal District, of which the City of Mexico is the chief city, is now governed similarly to the District of Columbia, United States. The powers of government and administration are lodged with three federally appointed officials, namely, the governor of the District, the president of the superior board of health, and the director of public works. Besides the special powers belonging to each of these officials, the three may act together as one superior governing body. Each town within the Federal District continues to elect its own board of aldermen, but their powers now are restricted to those of advice, supervision, and veto. The board of each town may suggest measures to the three district commissioners for the benefit of its own constituents; it may see that measures adopted for its own constituents are properly carried out; it may suspend public works by a veto which can be annulled only by the President of Mexico, acting with the advice of his cabinet. Municipal affairs are excellently administered. The city is well policed. Over 500 unmounted policemen are always on duty, one being stationed at every corner. The street cleaning department keeps the streets in good condition. The city is lighted chiefly by electricity. The service includes 516 arc lights of 2,000 candle-power, 430 of 1,200 candle-power, and some 200 incandescent lights. Two lotteries exist, but other gambling concerns have been closed for more than a year.

The city issues licenses to 1,900 shops for the sale of wines, liquors, beers, and pulque. All *pulquerias* (pulque shops) are closed at six o'clock throughout the year. Drinking-places of all kinds by a new law are closed at noon Sunday and remain closed till Monday morning. This has resulted in reducing the number of Sunday arrests for crime to one third the former number. The providing an adequate water-supply has long been a problem to the municipality. President Diaz in his message at the opening of Congress, September 1903, states that the solution of the problem is in sight. At present the water comes from six different sources outside the city, which yield about 36,800 litres per minute, and from eleven public and 1,375 private artesian wells in the city, which yield about 22,000 litres per minute.

Public Works.— The city is situated at nearly the lowest point in the valley, and from the earliest times had always been in danger of inundation. There are six lakes (so called) within the valley, all of which, with the exception of Texcoco, are above the level of the city. In times of heavy rains their waters sometimes overflowed the banks and having no outlet through the surrounding mountains, found their way to Lake Texcoco which being only two or three feet below the level of the city, rose sufficiently to flood it. Before the Spanish Conquest and for some time afterward dikes were built about the city to keep the flood waters out, but these proved ineffective. Inundations occurred on an average once in 25 years. In 1608 the cut of Nochistongo was made through the mountains, as an outlet for the flood waters of the highest lake in the valley which is 13 feet above the level of the city. But this work only partly relieved the situation. In 1629 there was another flood and the city was submerged to a depth of three feet for five years. This paralyzed business and caused great loss of life and property. The



THE CROWD IN THE PLAZA MAYO, GATHERED ABOUT THE CATHEDRAL ON A FEAST DAY.

Univ. Library, UC Santa Cruz 2001

Spanish government ordered the site of the city to be changed to higher ground. But presently, owing to a very dry season and to earthquakes, the waters passed away and the royal order was not carried out. The present canal and tunnel is the joint undertaking of the city and of the national government. It is designed to serve a twofold purpose: to control the waters of Lake Texcoco, thus removing all possibility of future inundations; to be a continuation of the city's sewerage system. It starts just east of the city, where it joins the network of city sewers. It extends to the mountains, a distance of 30 miles, connecting with Lake Texcoco, on its way. It pierces the mountains by a tunnel seven miles long, and beyond the mountains is continued as a canal for several miles. The canal was finished in 1896. The sewerage system is now (1903) nearly completed. The city can never again be inundated and it is now provided with an effective sewerage system of which from the very beginning of its existence it had been in the greatest need.

Finances.— In 1902, the municipal taxes yielded a revenue of $6,500,000 (Mexican silver). The expenditures for the same period were $4,000,000. In the list of taxes on personal property in 1902, 819 private carriages paid a monthly tax averaging about $10 each; 4,015 bicycles, $1 a month each; 2,700 carts and wagons an average monthly tax of $5 each. In 1902 the licenses from 1,230 tobacco stores; 854 places where wines, liquors, and beers were sold; 972 pulquerias (pulque shops) yielded the city a monthly revenue of about $65,000. Licenses from 61 pawnshops in 1902 yielded a revenue exceeding $8,000 a month. The tax on tradesmen is proportioned to the volume of business. The tax on street peddlers and small booths is collected daily, the amount depending upon the stock on hand. Taxes as low as a few cents a day are collected The water-tax yields a revenue (1903) of about $250,000 annually. The tax on rents is about 12 per cent, houses unoccupied not being taxed at all. Among the municipal expenditures in 1902, were those for: water, which averaged about $30,000 a month; street cleaning, about $13,000 a month; lighting, about $26,000 a month.

Population.— The native population embraces descendants of Spaniards, and of some other Europeans, Indians, and mixed races. The foreign population consists mostly of Spaniards, Americans, Germans, French, and English. In 1902 there were 6,000 American residents engaged in business. The great majority of these are in the employ of railroads and mining companies, or represent United States business houses. Almost all the shop-keepers are either French or Germans, a few are Spaniards, hardly any are Jews, and a few are Americans. The total population is 1900 was 370,000.

Public Health.— The death rate has always been very high, sometimes reaching 50 per 1,000. This high rate has been owing: partly to the great infant mortality among the very poor, especially the peon class; partly to very defective drainage. With the completion of the excellent system of sewers the death rate will no doubt be greatly lowered. Referring to this matter, President Diaz, in his message at the opening of Congress, in September, 1903, stated that during the first half of: (1901) the deaths numbered 12,100; (1902) 10,442; (1903) 8,858.

Education.— The public school system of the country has its centre in the City of Mexico. The schools are divided into three grades, namely, primary, advanced primary, and national preparatory. Attendance at the first is compulsory. The work covers from four to six years and comprises chiefly the elementary studies. The second grade carries on the work of the first, and includes also French and the natural sciences. The national preparatory aims to prepare for the professional schools. The course of study extends through six years. The first two are devoted almost exclusively to the study of mathematics, French, and Spanish. The work of the remaining four years includes the literatures of Germany, Spain, and Mexico. Neither Latin nor Greek is taught in the public schools. These schools are supported both by the city and by the federal government.

Besides the public schools supported by the government there are also free primary schools maintained either by Roman Catholics or Protestants. There are also a great many private pay schools. Among the professional schools are those of law, medicine, theology, fine arts, music, and the applied sciences. All the professional schools are independent of each other. The friends of education in the city hope to see the national preparatory and the professional schools consolidated into a national university.

Newspapers.—There are 15 daily newspapers. The *Herald* and the *Record* are in English. *El Imparcial* has the largest circulation of any newspaper in all Mexico. The official government organ is *Diario Official.*

Religion.— Roman Catholicism is the religion of all but a very small part of the population. There are 11 Protestant churches, including two Methodist, two Episcopal, two Presbyterian, one Baptist, one Christian Scientist. Nearly all these denominations maintain missions, both in the city and in other parts of the country. A Young Men's Christian Association has been formed and has a membership of 430, more than half of whom are Americans, the next numerically being Mexicans and English. A Women's Christian Temperance Union has also been lately organized. All these worthy undertakings receive the encouragement of President Diaz.

Charities.— There are a great many charitable institutions. Of these more than 20 are hospitals, the oldest being that of Jesus Nazareno, founded by Cortes. A general hospital, nearing completion (1903), is to consist of 60 separate buildings and will be one of the largest in the world. Besides these public hospitals, there are also several private ones, maintained by voluntary contributions. There are also asylums for the poor, insane, blind, and foundlings. A unique and very remarkable benefaction is the Monte de Piedad (Mountain of Mercy), the national pawnshop. It was founded in 1774, by a wealthy mine owner for the sole purpose of lending to the poor, on pledges, sums of money, at very low rates of interest, thus protecting them from the extortionate charges of private pawnbrokers. After a certain length of time the unredeemed pledges are sold, and when all expenses are paid the balance in each case is returned to the original owner.

Amusements.— Sunday is the day of all others for recreations and amusements. After the morning service at the churches the day is given up to pleasures. First, the band concert in the Alameda; in the afternoon the bull fight; and the theatre in the evening. There is now but one bull ring in the city. It has a seating capacity of 15,000 and is sometimes crowded. The government has tried to abolish this sport, and laws have been passed to this end, only to be repealed, so strong have been the protests of the masses of the people against this action. The old theatre, the Teatro Nacional, has been replaced by a commodious structure at the terminus of Cino de Mayo street. There are also several smaller theatres.

Pulque.— The national beverage of Mexico is pulque. It was in use at the time of Cortes and no one knows how long before. It is made of the fermented juice of the *agave Americana*, or century plant. One plant will often yield two gallons a day. Special pulque trains from the country arrive daily. Eighty thousand gallons are said to be consumed daily in the city alone.

History.— Of what often passes for the history of the city before the Spanish Conquest, and indeed, for many years after, it would be hard to tell how much is true, and how much false. But there is no doubt that it was founded by the Aztecs. It is generally accepted as true that they came from some unknown region in the Northwest, perhaps north of the Gulf of California, that for more than 100 years they wandered in the Mexican Valley, that they settled near the centre of the valley on islands of Lake Texcoco, in the early part of the 14th century. Tradition says they were directed by the oracle to settle where they had seen, perched on a cactus, an eagle devouring a snake. Hence the centre of the national coat-of-arms. The original name of the city was Tenochtitlan.

In the centre was the great *teocalli* (temple). The first rude houses, standing on piles, and built of mud and rushes, before the Spanish Conquest had been replaced by buildings of stone. The city had a radius of about half a mile; an area of about one quarter that of the present city. It was intersected by canals; hence sometimes called the Venice of the Western world. With the mainland it was connected by causeways. During the Spanish Conquest (1519–21) the Aztec city was completely destroyed, not a vestige of it remaining. No trustworthy record exists as to the size of the population at this time. One contemporary writer states that it was 500,000; another, 30,000. On the same site in 1522 Cortes began the building of the Spanish city. But so many changes have been made since then that the city of to-day retains hardly a trace of the city founded by Cortes. In 1600 its population consisted of 7,000 Spaniards and 8,000 Indians. In 1746 it had a population of 90,000; fifty years later one of 113,000.

For nearly 300 years it was the capital city of New Spain. Some of the viceroys were good men and able rulers and among other good deeds, did much to improve the condition of the city. Events, not already mentioned, especially noteworthy in the life of the city, were: the riot of 1692, provoked by a famine, and causing the loss of more than $3,000,000 worth of property; the capture of the city by Agustin Iturbide and his triumphal entry 27 Sept. 1821, the date which marks the end of Spanish power in Mexico; Iturbide's election as emperor, 22 May 1822; the capture of the city in 1847 by the Americans under Gen. Scott; the taking effect in 1859 of the Laws of Reform, and the consequent suppression of convents and monasteries, and the confiscation of church property; the capture of the city by the French, 9 June 1863; its capture 21 June 1867 by the Liberal army led by General Diaz; the return to the city nearly a month later of President Juarez. Since the beginning of President Diaz's second administration in 1884 the city has had a period of uninterrupted peace. His enlightened, liberal, and progressive policy has greatly improved not only the condition of the country but that of the city as well. It is becoming modernized and filled with new life.

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Mexico, Gulf of, an arm of the Atlantic Ocean, bounded on the north by the United States and on the south and west by Mexico. It is oval in form; its greatest length is from east to west, about 1,000 miles; from north to south, about 800 miles; area, about 700,000 square miles. It has a continuous coast-line of about 3,000 miles. Its maximum depth is about 12,715 feet, and within the basin, exclusive of the submerged coastal plain, the average depth is about 9,000 feet. In former ages the area of the Gulf was much greater than at present; it included the lower basin of the Mississippi, Florida, a large part of eastern and southeastern Mexico, and the basins of the northern rivers of South America. The outlet of the Gulf is on the east, between the peninsulas of Yucatan and Florida, a distance of 450 miles. At this outlet is the island of Cuba, which is separated from Florida by the Strait of Florida, 125 miles wide, and from Yucatan by the Yucatan Channel, 120 miles wide. The Yucatan Channel opens into the Caribbean Sea and the Florida Strait enters the Atlantic.

The temperature of the Gulf is from 8° to 9° higher than in the Atlantic in the same latitude. The temperature at the point of greatest depth is 39½°, or the same as the temperature at the greatest depth of the Yucatan Channel, although the maximum depth of the Gulf is about 5,943 feet more than that of the channel. The chief current is the Gulf Stream (q.v.) which enters the Gulf through the Yucatan Channel, circles the interior and passes out through Florida Strait. The winds are about as on other parts of the globe where north-equatorial conditions exist; the prevailing winds from the north blow from September to March, and from the south from March to September. The severe gales are in the winter. The northern part of the Gulf, from Mexico to Florida, is really a coastal plain averaging from 40 to 100 miles wide. The basin off the Mexican coast sinks rapidly to the submarine plain, and a short distance from shore reaches the maximum depth. The Bay of Campeachy is the largest indentation. Other bays are Havana, on the coast of Cuba, Pensacola, Tampa, Mobile, and Galveston, on the United States coast, and Vera Cruz on the coast of Mexico. A number of small bays and lagoons are on the western coast. The principal islands are at the entrance of the Gulf; Cuba the largest, and north of Cuba, the Florida Keys, a group of coral islands. There are a number of small islands in the southeastern part of the Gulf, off the coast of Yucatan, and some in the Bay of Campeachy. The delta of the Mississippi consists of low, marshy islands. The principal rivers which flow into the Gulf are the Mississippi, the Colorado, Brazos, Sabine, Mobile, and the Appalachicola from the United States, the Rio Grande on the boundary between the United States and Mexico, the Rio Verde, and several short streams from Mexico. The chief cities on the coast are Havana, Florida Keys, Tampa, Mobile, Galveston, and Vera Cruz. New Orleans and Houston have direct ship communication with the Gulf, and Mexico City uses Vera Cruz as its port.

Mexico, a state of the United States of Mexico; in the southeast; bounded by the state of Hidalgo on the north; on the east by Tlaxcala and Puebla, on the south of Morelos and Guerrero, and on the west by Michoacan and Queretaro. See MEXICO — THE STATES OF.

Mexico, Mo., city, county-seat of Audrain county; on Salt River, and on the Wabash and the Chicago & Alton R.R.'s; about 115 miles northwest of Saint Louis. Mexico was settled in 1833 and in 1852 was incorporated. It is in an agricultural section, the chief products of which are wheat and corn. The manufactures are dressed marble, wagons, plows, flour, stove lining, fire-brick, and foundry products. Mexico is the seat of the Missouri Military Academy, and of the Hardin College for Women, founded in 1873. The charter under which the government is administered was granted in 1893, and provided for a mayor who holds office two years, and a council. Pop. (1910) 5,939.

Meyer, mī'ĕr, **Eduard,** German historian: b. Hamburg 25 Jan. 1855. He was educated at the universities of Bonn and Leipsic, and after completing his studies spent one year in Constantinople. In 1879 he went to the University of Leipsic as *privat-docent;* in 1885 became professor of ancient history at Breslau, and in 1889 at Halle. He has written 'Geschichte der Alten Ægypter' (1877); 'Geschichte des Altertums' (1884–1902), his largest work; 'Forschungen zur Alten Geschichte' (1892–9); 'Untersuchungen zur Geschichte der Gracchen' (History of Greece) (1894); 'Wirtschaftliche Entwickelung des Altertums' (1895); and 'Die Entstehung des Judentums' (1896).

Meyer, Heinrich August Wilhelm, German biblical commentator: b. Gotha 10 Jan. 1800; d. Hanover 21 June 1873. He studied at Jena, was pastor at Harste, Hoye, and Neustadt, and upon his retirement in 1848, settled in Hanover. He is remembered for his 'Commentaries on the New Testament,' begun 1832. Since his death this work has been continued by Weiss, Wendt, Beyschlag, and others. The English translation in Clark's series is in 20 volumes (1873–82), and there is an American edition in 11 volumes (1884–8).

Meyer, Johann Georg, yō'hän gā'ōrg, commonly known as "Meyer von Bremen," German painter: b. Bremen 28 Oct. 1813; d. Berlin 4 Dec. 1886. In his twenty-first year he went to Düsseldorf and began his studies under Sohn and Schadow; in 1841 he opened a studio of his own but removed to Berlin as his fame increased (1853). While scenes from the Bible were first the subjects of his brush, he later turned his attention to incidents of popular life, especially among the Hessian peasantry, and finally to the portrayal of family life in its pathetic aspect. Such pictures as 'The Jubilee of a Hessian Pastor' (1843); 'Christmas Eve'; 'Blindman's Buff'; 'The Soldier's Return'; 'The Inundation' (1846); 'The Repentant Daughter' (1852, in the gallery at Bremen), are full of intense sympathy with the homely "annals of the poor." After taking up his residence at Berlin, he chose especially scenes from child life, which he rendered with spirited humor. Among his pictures of this kind are 'The Fairy Tale'; 'Children Playing Blindman's Buff'; 'Grandfather and Grandchild'; etc. A third group of his pictures includes those of young women, as single figures or in groups. Such are 'The Tryst'; 'The Love Letter.' All his works are distinguished by true human feeling, truthfulness and thoroughness of execution.

Meyer, Joseph, German publisher: b. Gotha 9 May 1796; d. 27 June 1856. He organized various industrial undertakings, founded a publishing business at Gotha, which soon attained large proportions, was removed by him to Hildburghausen (1828), and in 1874 was transferred to Leipsic. The best-known of his publications is the 'Meyers Konversations-lexikon,' the rival of Brockhaus in the encyclopædia field, which has been brought down to date by constant revisions and supplements. He published also a series of the German classics, a 'Historical Library,' and a 'Library of Natural Philosophy.'

Meyer, Klaus, German painter: b. Linden, Hanover, 20 Nov. 1856. He entered the Art School at Nuremberg in 1875, studied there 12 months, and subsequently became a pupil of Wagner and Lofftz at Munich. The result of their teaching, added to a patient study of the Dutch masters of the 17th century, appeared in the delicacy, vivid characterization and refined coloring of his work, which won him a place among the first of living Dutch painters. These qualities are exhibited in a Dutch interior produced by him (1882) in which are two figures in the costume of the 17th century. This work recalls the finest creations of Pieter de Hoogh (q.v.), and Van der Meer von Delft (q.v.), although Meyer prefers an atmosphere of cool silver tone to the warm golden lights of those masters. Another interior, a Beguin monastery scene (1883) won for him the grand gold medal at the International Art Exhibition at Munich. He painted many pictures in a similar vein, such as 'The Monastery School'; 'The Singing Nuns'; 'Old and Young Cats' (in the Dresden Gallery 1885); 'The Spy,' an incident in the Franco-Prussian War; and 'Lady Reading a Letter' (1892). In 1891 he was appointed instructor in the Art Academy at Carlsruhe, and

1895 professor in the Art Academy at Düsseldorf. At the Berlin Exhibition of that year he was awarded the grand gold medal.

Meyerbeer, mī'ĕr-bār, **Giacomo** (Italianized form of Jakob Meyer Beer), German composer: b. Berlin 5 Sept. 1791; d. Paris 2 May 1864. His father, Jakob Beer, was a rich banker of Jewish descent, and of high reputation in the commercial world. The son gave early proof of his devotion to the art of music, and at nine was regarded as a masterly pianist in a city full of excellent musicians. After studying composition under Bernhard Anselm Weber he entered in 1810 the school of the Abbé Vogler at Darmstadt, where for three years he had the companionship of Karl Maria von Weber (q.v.). An intimate friendship sprang up between them, which was only interrupted by the death of the latter. While at Darmstadt Meyerbeer composed a cantata, ‘Gott und die Natur,’ which brought him the appointment of court musician to the grand-duke. In 1812 his opera ‘Jephthas Tochter’ was produced at Munich, but failed to please the audience, though highly praised by Weber, Vogler, and other musical authorities. Discouraged by its public reception, Meyerbeer went to Vienna, where he made his début as a pianist with such success that he seemed destined to eclipse the fame of all contemporary artists. Commissioned by the court of Vienna he produced ‘Abimelek, oder die beiden Kalifen,’ which was no more successful than his former effort. He was induced to visit Italy, and became a convert to the new musical school of that country. He rapidly composed in this style a series of operas, which were generally well received:—‘Romilda e Costanza’ (1818); ‘Semiramide Riconosciuta’ (1818); ‘Emma di Resburgo’ (1820); ‘Margherita d'Anjou’ (1822); ‘L'Esule di Granada’ (1823); and ‘Il Crociato in Egitto’ (1824). The success of the last-mentioned opera traveled beyond the Alps, and the composer was invited to Paris to superintend the preparations for the production of the ‘Crociato’ at the Grand Opéra, where it met with an enthusiastic reception. In 1831 his ‘Robert le Diable’ was produced for the first time, and the excitement it caused was perhaps unparalleled on the Parisian stage. Meyerbeer had ceased to be a pupil of Rossini, and ‘Robert’ combined in a singular degree oriental gorgeousness, German massiveness, French vivacity, and Italian brilliancy, which the preceding works of the composer had not prepared the world to expect. He reached the climax of his fame by his next opera, ‘Les Huguenots’ (1836). It was followed at long intervals by ‘Le Prophète’ (1849); ‘Pierre le Grand’ (‘L'Etoile du Nord’ 1854); ‘Le Pardon de Ploermel’ (‘Dinorah’ 1858); and ‘L'Africaine’ (1865). The composer did not live to see the production of his last work. Besides his operas he wrote many songs, an oratorio, cantatas, a Te Deum, music for the tragedy of ‘Struensee’ by his brother, and other works. Consult: Pougin, ‘Meyerbeer’ (1864); De Lasalle, ‘Meyerbeer, sa Vie Catalogue de ses Œuvres’ (1864); De Bury, ‘Meyerbeer, sa Vie, ses Œuvres et son Temps’ (1865); Mendel, ‘Giacomo Meyerbeer, eine Biographie’ (1868).

Meyerheim, Friedrich Eduard, frēd'rĭн ed'oo-ard mī'ĕr-hīm, German artist: b. Dantzic 7 Jan. 1808; d. Berlin 18 Jan. 1879. He studied landscape painting in his native town, and in his 22d year went to Berlin, where he attended the Academy and fell under the influence of Schadow. Ten lithographic views of Dantzic, published by him in 1832, were included in his ‘Architektonische Denkmäler der Altmark Brandenburg,’ which appeared the following year. Between 1833 and 1841 he produced a number of genres with a romantic motif as illustrative of peasant and bourgeoise life. Of such a character is ‘The Champion Shot’ (1836) in the Berlin National Gallery. In his search for character, costume, scenery and incident he traveled, studied and sketched over a wide area of territory which included Westphalia, Altenburg, Thuringia, Hesse, and the Harz district. His admirable genres are distinguished by a clear enamel-like coloring. Amongst the most notable are: ‘Leaving Church in Altenburg’; ‘In an Altenburg Cornfield’; ‘The Little Kid’ (1842); ‘Bedfellows’ (1844); and his masterpiece, ‘Waiting’ (1845). Consult his ‘Autobiography’ (1880).

Meyerheim, Paul, powl, German painter: b. Berlin 13 July 1842. He was a son of Friedrich Eduard Meyerheim and was taught by his father, and afterward studied at the Berlin Academy. Travel through Belgium and Holland enlarged his artistic experience and knowledge, and he afterward spent a year at Paris. He then returned to Berlin, where he applied himself to animal painting, but also did some portrait, genre of common life, humorous scenes, still life, interior decoration of buildings, etc. He executed works both in oil and watercolors, and his versatility is only equaled by his delicate sense of color and brilliant technique. Considering all these qualities his fertility must be called extraordinary. Some of his best works are: ‘History of the Locomotive in Seven Pictures on Copper’ (Villa Borsig, Berlin); ‘An Antiquary of Amsterdam’ (1869); ‘Four Seasons in the Life of a Bird’; ‘In the Menagerie’ (1891); ‘Portrait of his Father and D. Chodowiecki’ (1887); ‘The Theatre of Monkeys’; ‘The Hare and the Frog’; ‘Tourists in the Mountains Meeting a Herd of Cattle’; etc. In 1863 he undertook a journey into Egypt, from which he brought back many landscape and figure studies. He is a Royal professor, and has been awarded the grand gold medal at the Berlin Exhibition.

Meynell, mī'nĕl, **Alice Thompson,** English poet and essayist: b. London, England. She spent much of her childhood in Italy, and was married in 1877 to Wilfrid Meynell, a London journalist. She has published ‘Preludes,’ a collection of poems (1875), illustrated by her sister, Lady Elizabeth Butler (q.v.); ‘Rhythm of Life’ (1893); ‘The Color of Life’ (1896); ‘The Children’ (1896); ‘The Spirit of Place’ (1898); ‘John Ruskin’ (1900); ‘Later Poems’ (1901). Consult Archer, ‘Poets of the Younger Generation’ (1902).

Meyrick, mī'rĭk, **Frederick,** English Anglican clergyman and controversialist: b. Ramsbury vicarage, Wiltshire, 28 Jan. 1827. He was educated at Oxford, where he was tutor (1851–9). Since 1868 he has been rector of Blicking, Norfolk, and a canon non-residentiary of Lincoln from 1869. Among his many works, some of which are controversial books in Latin, Spanish, etc., may be cited ‘The Practical Working of the Church in Spain’ (1857);

'Kingsley and Newman' (1864); 'Justin Martyr' (1896); 'Ritual and Ritualism' (1901).

Mezen, mĕz-āny', or **Mesen**, a river in the northern part of Russia in Europe. It rises in the Timan Mountains, flows north and south, forming two loops, then its course changes to the northwest, and enters the White Sea through Mezen Bay. It is about 525 miles in length. It is navigable for some distance from the mouth; but is ice-locked about six months in the year.

Meze'reon, a shrub (*Daphne mezereum*). See Daphne.

Mézières, Alfred Jean François, äl-frā zhŏṅ fräṅ-swä mā-zē-ār, French critic and politician: b. Rehon 19 Nov. 1826. He studied at the Ecole Normale and in Athens; was professor of literature at Nancy (1854–61), and at the Sorbonne; became an Academician in 1874; in politics is a member of the moderate Opportunists; and was deputy from 1881 to 1900, when he was elected senator for Meurthe-et-Moselle. Besides contributions to the 'Revue des Deux Mondes' and 'Temps' he wrote 'Shakespeare' (1861), 'Shakespeare's Predecessors and Contemporaries' (1863); 'Shakespeare's Contemporaries and Successors' (1864); 'Dante' (1865); 'Petrarch' (1867); 'Goethe' (1872–3); 'In France' (1883); 'Outside of France' (1883); 'Mirabeau' (1891); and 'Dead and Living' (1898).

Mez'zanine, in architecture, a low window occurring in attics and entresols. Sometimes applied to an entresol. A mezzanine story is a half story; one lower than the stories above and below it. In theatres it is usually a floor between the stage and the bottom of the deep cellars of large theatres, from which floor the short scenes and traps are worked, the large scenes going down through openings into the cellar; hence the name, from being midway between the stage and cellar floor.

Mezzofanti, Giuseppe Gaspardo, joo-sĕp'pĕ gās-pār'dō méd-zō-făn'tē, Italian linguist: b. Bologna 17 Sept. 1774; d. Rome 15 March 1849. He studied at the seminary of Bologna, and took priest's orders in 1797. He was appointed librarian and professor of Oriental languages at the university, in 1831 went to Rome, there succeeded Angelo Mai as keeper of the Vatican Library (1833), and in 1838 was made cardinal, It is said that he was familiar with over fifty languages, and even with the provincialisms of these various tongues. Byron called him "a monster of languages, the Briareus of parts of speech." His library and his papers came into the possession of the University of Bologna. His attainments were not entirely limited to proficiency in languages, but only one printed work of his, a eulogy of Emmanuele da Ponte, a Spanish Jesuit who had taught him Greek, is in existence. Consult the 'Life' by Russell (1858; 2d ed. 1863); Manavit, 'Esquisse Historique sur le Cardinal Mezzofanti' (1854); 'Quarterly Review,' Vol. CI.

Mezzotint, met'sō-, a process of engraving on copper which dates from the 17th century. The smooth plate of the metal is abraded with a file-like tool, and tiny points are raised over the surface. These points catch and hold the ink, and an impression taken from a plate in this condition would give a soft velvety mass of black without variety of light and shade. A burnisher is next used to get rid of the raised points where half tones and lights are wanted. Sometimes where very brilliant high lights are required, they are cut away so as to insure a smooth surface of copper. By means of this burnishing process, all gradations of light and shade are obtained from the white of the smooth copper to the black of the roughened plate.

Mhow, m-how', India, town and British cantonment, in the Rajput state of Indore, 13 miles southwest of Indore. The town, situated on an eminence above the Gumber, is European in its appearance, having a church with a conspicuous steeple, a well-furnished library, a spacious lecture-room, and a theatre. The cantonment, occupied by a considerable force, in virtue of the Treaty of Mandsaur, is situated half a mile southeast of the town, at the height of 2,019 feet above the sea. Mhow was one of the centres of the Sepoy mutiny of 1857. Pop. about 37,000.

Miagao, mē-ā-gä'ō, Philippines, a pueblo of the province of Iloílo, Panay, on the southern coast of the island on Iloílo Strait, 22 miles west of Iloílo, the provincial capital. Pop. 22,100.

Miako, mē-ā'kō. See Kioto.

Miall, mī'al, **Edward**, English non-Conformist politician: b. Portsmouth 8 May 1809; d. Sevenoaks, Kent, 29 April 1881. He studied at Wymondley Theological Seminary, Hertfordshire; was pastor of independent chapels in Ware, 1831-4, and in Leicester, 1834-41; then removed to London, where he founded the "Non-Conformist," a weekly devoted to disestablishment; and in 1852 was elected to the House of Commons. He urged the disestablishment of the Irish Church in 1856, and repeatedly moved for the formation of committee on English disestablishment. He retired from Parliament in 1874, and received a subscription of 10,000 guineas in 1873. He wrote 'The Non-Conformist Sketch Book' (1845), 'The British Churches in Relation to the British People' (1849); 'An Editor off the Line' (1865), and 'Social Influences of the State Church' (1867). Consult the 'Life' by his son Arthur (1867).

Miall, Louis C., English naturalist: b. Bradford 1842. He was made curator of the Leeds Literary Society in 1871 and professor of biology in Yorkshire College in 1876. He is a fellow of the Royal Society and an examiner for the Indian Civil Service; became president of the zoological section of the British Association in 1897; and has written 'Object Lessons from Nature' (1891); 'Anatomy of the Indian Elephant' (1878); 'Natural History of Aquatic Insects' (1895); 'Round the Year' (1896); 'Thirty Years of Teaching' (1897); 'Injurious and Useful Insects' (1902).

Miami, mī-ăm'ē or -ĭ, a river of Ohio, which rises in Hardin County and flowing south and southwest for a distance estimated at 150 miles, passing Troy, Dayton, and Hamilton, enters the Ohio River at the southwest corner of the State, 20 miles west of Cincinnati. It is a rapid stream, passing through a picturesque and fertile country, and admits of navigation for only a portion of its length. Its principal branches are the West Branch, the Mad and the Whitewater rivers. The Miami canal runs along the river for about 70 miles, and together they furnish extensive power for manufacturing purposes. This river is sometimes called the Great Miami, in distinction from the Little Miami, which rises in Madison County, and after a southwest course of about 100 miles, nearly parallel to the former, enters the Ohio six miles east of Cincinnati. It is skirted for the greater part of its course by the Little Miami railroad, connecting Xenia and Cincinnati.

Miami Indians, an American tribe of the Algonquian family, residing in Wisconsin, and first known to the French settlers in 1660. In 1700 they removed to Illinois, Indiana, and Ohio, and later separated into two distinct tribes Wea and Piankishaw. In the Colonial wars the Miamis figured with both combatants, but eventually joined Pontiac's alliance in 1764, opposing the Americans. After their defeat by Gen. Wayne they signed a treaty at Greenville in 1795. They again joined the British against the Americans in 1812, fighting under Tecumseh (q.v.). In 1827 they sold most of their lands and removed to Kansas. Disease killed off the majority of them, and the remnant of the tribe, numbering perhaps 50, now reside upon the Quapaw reservation in Indian Territory.

Miami University, in Oxford, Butler County, Ohio, is a coeducational institution. In 1788 J. C. Symmes purchased from the United States 1,000,000 acres of land, bounded south by the Ohio River, east by the Little Miami, and west by the Great Miami. One condition of this purchase was, that a full township, six miles square, should be set apart «for the endowment of an academy and other seminaries of learning.» This condition was not complied with; but as the prospect of the establishment of a university within the bounds of Symmes' purchase had induced many to settle there, in 1803 Congress ceded to the State of Ohio the township of Oxford, to be held in trust for educational purposes. The university was incorporated in 1809. The lands are leased for 99 years (renewable forever, without re-valuation), subject to an annual quitrent of 6 per cent on the purchase money. The government is vested in a board of 18 trustees appointed by the governor of the State, six of whom retire every third year. A grammar school was established in 1818, and in November 1824 the college department proper was opened. The school has normal, preparatory, and college departments the courses leading to the degrees of B.A. and B.S. In 1910 there were connected with the institution 55 professors and instructors and 1,178 students. The grounds and buildings were valued at $250,000; the productive fund was about $52,000. There were over 19,000 volumes in the library. The State aid amounted to about $23,000, and the total income from tuition, productive fund, and State was about $265,000. The first class, consisting of 12 members, was graduated in 1826.

Miamisburg, mī-ăm'ĭz-bĕrg, Ohio, city, in Montgomery County; on the Miami River and the Miami & Erie Canal, and on the Cleveland, C., C. & St. L. and on the Cincinnati, H. & D. R.R.'s; about 45 miles north by east of Cincinnati. It is an agricultural region, and the good water-power has made it an important manufacturing place. It has large shipments of tobacco, manufactures, and cereals. One of the largest Indian mounds in the State is just outside the city. Pop. (1910) 4,271.

Mian'a-bug, a Persian tick of the genus *Argas*, greatly dreaded by travelers in former times; but its reputed powers of poisoning and otherwise harming humanity have been greatly exaggerated.

Miantonomoh, mĭ-ăn-tō-nō'mō, an American Indian chief, a sachem of the Narragansetts, who succeeded his uncle, Canonicus, in 1636. In 1637 he assisted the early settlers of Massachusetts in the Pequot war. In 1643 he attacked Uncas, his bitter rival, was captured and turned over to the commissioners of the United Colonies. He was placed on trial before an ecclesiastical court, found guilty, condemned to death, and Uncas was commissioned to carry out the sentence. A brother of Uncas, however, assassinated the captive before the sentence could be executed.

Mias'ma, or **Mi'asm** (Greek, «pollution»), a disease-producing emanation in the atmosphere, from decaying animal or vegetable material; malaria; malarial poison. Diseases at one time supposed to be thereby produced were classified as miasmata — such as intermittent and remittent fever, typhus, and typhoid fever. The term is used infrequently at the present day, as micro-organisms (bacteria-germs) are believed to be responsible for the spread of most of these diseases, and do not exist in the form of a miasm. While some of these organisms are carried by the atmosphere, and are inhaled, others are conveyed by insects to articles of food, and are taken into the body when such food is eaten. Others, still, are elaborated in a kind of mosquito (*Anophelcs*) and injected into the blood. See INSECTS, PROPAGATION OF DISEASE BY; MALARIA.

Mica (Lat. *mico*, flash), a mineral group, marked by high basal cleavage, and laminæ which may be made very thin by a process of continued separation. The micas are silicates; muscovite, the commonest, is a silicate of potassium and aluminum, and is often syled potassium mica; paragonite, or sodium mica, corresponds closely to muscovite, but has sodium instead of potassium; biotite, a silicate of magnesium, potassium and iron, is marked by its darker tints, and is commonly called magnesium iron mica; lepidolite is a lithium mica, with fluorine, potassium, and aluminum in its composition, and a rose tint. Mica is widely scattered in North America and Asia, especially India. Ruby colored mica, no matter what its provenance, is now called «Indian.» Europe has no commercial supply. Deposits are most frequently found in pegmatite dikes, varying in thickness from a few inches to several hundred feet, and correspondingly in length. Many other minerals accompany it, especially quartz and feldspar, and the mica is scattered through the dike, or vein, as the miners call it. Moreover, scarcely more than 10 per cent, and sometimes as little as 2 per cent, is commercially useful. Mica was well known in prehistoric America, traces of its use being widespread. A great shaft near Mount Mitchell, in North Carolina, was discovered in 1869. This not merely solved the question as to the origin of the early supply, but gave the first impulse to the mining of mica in the United States. Mica lands in North Carolina became tremendously valuable. This boom was quickly followed by the development of the industry in southern New Hampshire; and this in turn by important discoveries, in the 80's, in Canada and India. In Quebec, Ottawa, and Perth and Renfrew counties, Ontario, the supply is of excellent quality, and hence is easily mined and cheap. Hindu labor and an excellent grade of mica make the output of Bengal, Bombay, and the Madras presidency even cheaper. To classify the various sources of supply roughly, it may be said that India gives the world one half, and Canada and the United States each about one fourth of the entire supply. Everywhere the «veins» start near the surface; hence mining is simple. In New Hampshire there has been a break from the primitive methods, but in North Carolina, apparently the richest field in the United States, the mining is still unorganized, being done almost entirely by farmers, with the simplest of tools, between crops. In this region, mica is largely used as a medium of exchange between farmers and storekeepers.

In 1870 mica waste was first utilized by Frederick Beck, who introduced the use of «mica-flour,» or ground mica, as a coating for cheap wall-papers. Scrap-mica, formerly worthless, rose to $17 a ton, and then gradually fell to $6 or $7. This branch of the business is confined to the United States. Since 1895 there has been a fresh and most important use for mica, namely, as an insulator. For this purpose the sheets are split very thin and glued to cloth, then wound into rings for armatures. As a result of this variation of the uses of mica, only the colorless sorts, notably muscovite, are largely used for lamp chimneys and stove doors. Mica is also valuable as a lubricant, as an absorbent of glycerin in making dynamite, and, in the case of the lithium silicates, such as lepidolite, in the manufacture of lithium salts.

Mica Schist, shĭst, a schistose rock, metamorphic in nature, containing mica and quartz. The origin of most of the mica schists is uncertain; the sericite variety seems to be the result of mountain-building forces acting upon igneous rocks; other sorts are almost as certainly due to the same force acting upon sedimentary rocks. Mica occurring in schist is usually muscovite, that is, the colorless sort; biotite, or dark mica, is less frequent. Various embedded minerals occur, notably garnets.

Micah, mī'kạ, the sixth of the minor prophets, dwelt in Moresheth, a little town, once a dependency of the Philistian city of Gath, but by the conquests of Uzziah reduced with the whole of western Judah, including the city of Gath, to Hebrew domination. His main public work was accomplished during the reign of Hezekiah. He dwelt on the great international highway between Egypt and Assyria and was led to take a wide view of the political movements in Western Asia in their effect upon his own people. He lived in the 8th century B.C. and he witnessed the ending of the northern kingdom, and the invasion of Palestine by Sargon and Sennacherib. He witnessed also the coruption of morals which Hezekiah only partially corrected. His prophecy is directed against Samaria and Jerusalem, whose sufferings for their sins and irreligion he declares shall be greater than those of Babylon and the other Gentile cities. His style is pure and correct, his images bold, his denunciations full of strength and severity.

Micah Clarke, a novel by A. Conan Doyle, published 1888. It presents in the form of fiction a graphic and vivid picture of the political condition in England during the western rebellion, when James, duke of Monmouth, aspired to the throne, and Englishmen were in arms against Englishmen.

Micawber, mĭ-kâ'bėr, **Mr. Wilkins,** a shiftless, unsuccessful optimist, always in trouble, but always sure «something will turn up,» one of the secondary characters in Dickens' ‹David Copperfield.› He is said to have been drawn after the novelist's father, and Mrs. Micawber, who has great faith in her husband, to have been patterned after Dickens' mother.

Michael, mī'kĕl or mī'kā-ĕl (Hebrew, «who is Godlike»), is spoken of in Daniel (x. 13, 21; xii. 1) as one of the «chief princes,» and the «great prince.» In Jude (verse 9) he is called the archangel who disputed with the devil about the body of Moses. In the Revelation (xii. 7) it is said «there was war in heaven: Michael and his angels fought against the dragon.» From this expression it has been inferred that he was the chief of the celestial hierarchy. Milton calls him «of celestial armies prince,» and «prince of angels,» and attributes to him the command of the heavenly forces. He was ranked by Thomas Aquinas, followed by Dante, as the first of the seven archangels. In France especially churches dedicated to this saint are often built on the loftiest hill tops, to afford the warrior angel a vantage ground in warring against the evil «powers of the air» and driving off plague, drought and murrain.

Michael I., Rhangabe, or **Rhagabe,** Byzantine emperor: d. about 845. He succeeded Stauracius in 811 and after carrying on war with the Bulgarians was deposed in 813 by Leo V., an Armenian general in his service, and spent the rest of his life in a convent.

Michael II., Balbus (THE STAMMERER), Byzantine emperor: d. 829. He came of an obscure Phrygian family, but was ennobled by Leo V. The latter, however, suspecting Michael of conspiracy against him, ordered the Phrygian to be put to death. Michael saved himself by the assassination of Leo and became emperor in 820. During his reign Sicily and Crete were lost to the Western empire.

Michael III. (THE DRUNKARD), Byzantine emperor: d. 867. He was a grandson of Michael II., and in 842 succeeded his father, Theophilus, though his mother Theodora, continued regent till 856. With his uncle, Bardas, he made an expedition against the Bulgarians in 861 and converted the king of Bulgaria. In 866 he associated Basilius the Macedonian with himself in the government and was assassinated by him the next year.

Michael IV. (THE PAPHLAGONIAN), Byzantine emperor: d. 1041. He received his surname from the place of his nativity, and became chamberlain to Zöe, wife of the Emperor Romanus III. On the death of Romanus in 1034 he became emperor and the husband of Zöe, who is presumed to have murdered Romanus because of her love for Michael.

Michael V., Calapha'tes (THE CALKER), Byzantine emperor. He was a nephew of Michael IV., whom he succeeded on the throne. His banishment of the Empress Zöe led to a revolt in Constantinople, in which he was overthrown and compelled to retire to a convent.

Michael VI. (The Warrior), Byzantine emperor. He succeeded the Empress Theodora in 1056, but after the expiration of a year was deposed by Isaac Comnenus and spent the rest of his life in a convent. He was the last of the Macedonian dynasty.

Michael VII., Ducas, or **Parapina'ces,** Byzantine emperor. He was the son of Constantine XI., and came to the throne in 1071. He was a weak monarch, the prey of unscrupulous favorites, and an insurrection in 1078 drove him from the throne and into a monastery.

Michael VIII., Palæol'ogus, Byzantine emperor: b. 1234; d. December 1282. After having commanded the French mercenaries employed by the emperor of Nicæa he became one of the guardians of the Emperor John Lascaris in 1259. The next year he was proclaimed joint emperor of Nicæa in 1260, and the next year after deposing his colleague Lascaris, became sole monarch. In the same year he wrested Constantinople from the Latins and was shortly afterward crowned emperor of the Byzantine empire. He made an unsuccessful attempt to effect the union of the Western and Eastern Churches.

Michael IX., Palæologus, Byzantine emperor: d. 1320. He was the son of Andronicus II., with whom he was associated in the government after 1295, but died before his father.

Michael, czar of Russia. See Romanoff.

Michaelis, Johann David, yō'hän dä'vēd mē'hä-ā'lĭs, German biblical scholar: b. Halle, Prussia, 27 Feb. 1717; d. Göttingen 22 Aug. 1791. He studied at the University of Halle, traveled in Great Britain and Holland, became professor of philosophy at Göttingen in 1746, and professor of Oriental languages there in 1750. He was one of the editors (1753–70) of the 'Göttingen gelehrte Anzeigen,' and served for a time as librarian to the university. Modern biblical criticism in Germany sees in Michaelis one of its forerunners, whose works are of interest in the history of its development. They include his 'Hebräische Grammatik' (1778); 'Einleitung in die göttlichen Schriften des neuen Bundes'; 'Mosaisches Recht'; 'Moral' (1792–1823); 'Orientalische und exegetische Bibliothek' (1786–93). Consult his 'Lebensbeschreibung von ihm selbst abgefasst,' ed. by Hassencamp (1793), and his letters (1794–6).

Michaelius, mē-kä'lē-oos, **Jonas,** first Dutch Reformed minister in America: b. in the north of Holland 1577; d. Holland after 1637. He studied at Leyden, had a country church in Holland from 1612 to 1616; was sent to San Salvador, Brazil, in 1624; was transferred thence to Guinea in 1626; and in 1628 went to Manhattan, where he organized a consistory after the Dutch Reformed government. His last years were spent in Holland. A letter written by him describes the condition of the New York Indians, urging work among the children; it is published in the New York Historical Society's 'Collections' (1880).

Michaelmas, mĭk'el-mas, the feast of St. Michael and All Angels, 29 September. The festival was first appointed by Pope Felix III., 480. In the Greek Church it did not originate earlier than the 12th century. It was an old custom in England to mark the day by electing civil magistrates, perhaps in allusion to the analogy between the superintendence of magistrates and that of guardian angels, of whom St. Michael was reputed the prince. A more famous custom is that of eating roast goose, the origin of which has long exercised the wisdom of antiquaries. The traditional Michaelmas goose has been traced at least as far back as the 10th year of Edward IV.; and it is said that one of the strongest objections of the English commonalty to the reformation of the calendar was based on the confusion which would follow if Michaelmas day was not celebrated when stubble geese are in their highest perfection. There is an old proverb: «If you eat goose on Michaelmas day, you will never want money all the year round.»

Michal, wife of King David and younger daughter of King Saul. After David was driven away from court, and his life saved by Michal, who favored his escape, her father married her to Phalti, from whom David eventually recovered her, but was permanently alienated from her by her levity and want of sympathy with his enthusiastic joy over the return of the ark to Jerusalem.

Michaud, mē-shō, **John Stephen,** American Roman Catholic bishop: b. Burlington, Vt., 24 Nov. 1843. He was graduated from Holy Cross College, Worcester, Mass., in 1870, and was ordained in the priesthood in 1873. He was consecrated bishop in 1892.

Michaud, Joseph François, zhŏ-zĕf fräṅ-swä, French historian: b. Albens, Savoy, 19 June 1767; d. Passy 30 Sept. 1839. He became a journalist at Paris, where he wrote for Royalist papers, and stoutly upheld the monarchy; and in 1794 established the 'Quotidienne.' His opposition to the Revolution brought upon him sentence of death (27 Oct. 1795), and though the sentence was later revoked, he was finally exiled by the Directory, and went into hiding in the Juras. He was allowed to return under the consulate, but remained an apologist of the Bourbons, and at the Restoration took up the publication of the 'Quotidienne.' The well-known 'Biographie Universelle' was published under his direction. Among his more important works are: 'Histoire de l'Empire de Mysore' (1801); 'Histoire de Croïsades' (1812–22); and 'Collection de Mémoires pour Servir à l'Histoire de France depuis le XIIIme Siècle' (1836–9).

Michaux, André, äṅ-drā mē-shō, French botanist: b. Satory, Versailles, 7 March 1746; d. Madagascar 16 Nov. 1802. His father, a rich farmer, took him into partnership, but the death of his wife soon after their marriage drove him to the study of botany and to travel. He traveled through France and England in 1779–81; then through Persia and to the borders of Tibet (1782–5); and in 1785 to North America, where he made an exhaustive study of the flora of the Atlantic coast, and near Charleston, S. C., and in Bergen County, N. J., established large nurseries. In 1800 he set out on a trip to Australia, but died in Madagascar. He wrote a 'History of the Oaks of North America' (1801) and 'Flora Boreali-Americana' (1803).

Michaux, François André, French botanist, son of André Michaux (q.v.): b. Versailles 1770; d. Vauréal 23 Oct. 1855. He was his father's assitant, and in 1802 and 1806 was sent to North America by the French government.

He wrote a ‘Journal’ of his travels, translated into English (1805); ‘The Naturalization of American Forest Trees’ (1805); and the important ‘North American Sylva,’ translated by Hillhouse (1817–19) and completed, for western America, by Nuttall (1842–50).

Michel, François Emile, fräṅ-swä ā-mēl mē-shĕl, French painter and art critic: b. Metz 1828. After studying under Migette and Maréchal, he made his début in the Salon in 1853, since which he has produced ‘Summer Nights’ (1872); ‘Sowing in Autumn’ (1873); ‘The Harlem Sound’ (1885); the two latter being now in the Luxembourg. He was elected to the Institute in 1892. Among his works are: ‘Rembrandt’ (1886); ‘Hobbema et les Paysagistes de son Temps en Holland’ (1840); ‘Jacob van Ruysdael et les Paysagistes de l'Ecole de Haarlem’ (1890).

Michel, Louise, French anarchist: b. Vroncourt, Upper Marne, France, 29 May 1830; d. Paris, 9 Jan. 1905. When very young she wrote verses of unusual power and in 1860 opened a school in Paris. During the government of the Commune in 1871 she worked zealously in its behalf, was made prisoner, sentenced to deportation for life, but was pardoned by the amnesty of 1880 and returned to Paris where she edited ‘La Révolution sociale’ and continued her anarchistic teachings. She was imprisoned in 1883 and in 1886, and later made her home in London, where she continued her work. She published: ‘Le Coq Rouge’; ‘Les Méprisées’; ‘Ses Mémories’; ‘L'Ere Nouvelle’.

Michelangelo Buonarroti, mī-kĕl-ăn'jĕ-lō or mē-kĕl-än'jā-lō, boo-ō-när-rō'tē, whose name during his lifetime was written as Michelagnolo (or Michelangiolo) di Ludovico di Buonarroti-Simoni; Italian sculptor, painter and architect: b. Caprese, Tuscany, 6 March 1475; d. Rome 18 Feb. 1564. The family was well established as a family of citizens in Florence; but had been allowed heraldic bearings, a custom not unusual in relation to the controlling families of the Italian cities.

At a very early age Michelangelo became a student of fine art, entering first the workshop of Domenico Bigordi, called Ghirlandajo, and studying also in a primitive kind of art school which had been formed in the palace and gardens of Lorenzo dei Medici. It appears that the extraordinary abilities of the boy were noticed by his patrons and also by the artists of the epoch from the first. Michelangelo thought of himself only as a sculptor, and he put his energies into the study of bas-relief and statuary; studying the remains of Græco-Roman antiquity, which were accessible, and producing works of such importance as caused surprise to his contemporaries, although most of these very early works are either lost altogether or are uncertain — pieces which are usually ascribed to this epoch not having certain ascriptions. The earliest very important work which has remained to us is the Pietà, which is now in a chapel of St. Peter's Church at Rome. The figures are slightly larger than life, the Madonna holding the body of Christ on her lap in a not unusual attitude; a belt passing over the left shoulder of the Virgin is inscribed with the name of Michelangelo the Florentine: which is for years the only case in which Michelangelo signed a piece with his name. The famous group of the Madonna and Child in the Church of Notre Dame at Bruges, in Belgium, is generally accepted as the work of Michelangelo, and if so, was of this early epoch. The reason for its transportation to Bruges is disputed. An entirely authentic piece of the time is a colossal David, which having been for three centuries in the open air at the portal of the Palazzo Vecchio at Florence, is now under shelter in the Accademia in the same city. This extraordinary work is a frank attempt to render the as yet imperfectly developed form of a very young man.

The only portable painting which can with certainty be ascribed to Michelangelo belongs to the closing years of the 15th century, when Michelangelo was approaching the age of 25 years. This is the circular picture, a Madonna with the Child and St. Joseph, in the Uffizi Gallery. The fact of his producing this and several other small works of painting, is not to be counted against his accepted position as a sculptor; for most of the artists of the time practised in the different arts, and it is probable that Michelangelo was at this time much less in the habit of painting than were other sculptors of well known ability. His own continual occupation upon works of pure form in marble was a sufficient reason for his continued abstention from the sister arts.

With the election of Pope Julius II. began the Roman life of Michelangelo, for he was called upon by the new Pope in 1505 to build a great monument which the Pope desired to finish within his own life-time. This monument was never completed, however, and the controversies and other difficulties which arose continually with regard to it, embittered a large part of the great artist's life and consumed time which could but ill be spared from actual work. The great statue of Moses, which was executed at a somewhat later time (not to be exactly fixed), was the only very important piece of statuary completed for this tomb.

In 1506 Michelangelo returned to Florence, and at that time there was a decided pause in the work upon the tomb, as other thoughts had taken up the mind of the Pope. Indeed, his return to Rome was followed immediately by the commencement of the painting upon the vault of the Sistine Chapel. This work as we have it is much the most important piece of mural painting of the modern world, for it occupies the whole vaulted room, 133 feet long and 45 feet wide, and is one continuous and unbroken composition containing hundreds of figures, life-size, of heroic size, and colossal, and done in pure fresco, except as it has been retouched in places either by the artist himself or in later times, in what is called dry fresco — that is to say, the colors laid upon the dry plaster. There is this marked characteristic of the painting — that it has no landscape backgrounds except in the small compartments devoted to The Deluge and The Temptation, nor any other accessories as of costume, arms, buildings and the like; but is everywhere a simple architectural composition of painted pedestals and corbels seeming to carry figures which themselves are painted in the most abstract way — studies of the human form simply dressed and having no artistic interest other than that. It has generally been considered that the paintings draw their only importance from the astonishing power of the draughtsmanship and the great composition of abstract lines; but a more careful consideration of what they were before their partial defacement by the smoke of candles and the injuries and repairs which they have received, shows that the work is one of interest as to color composition as well. Michelangelo has never shown himself to be a colorist in the sense in which Correggio and the great Venetians were colorists, but then the medium in which he painted was fresco, that is, painting upon wet plaster, which does not lend itself to elaborate combinations of warm and profuse coloring — its tendency is always toward pale combinations and the expression of delicately modulated form rather than of chromatic splendor. It is not, however, intelligent criticism to say that these paintings are the work of a sculptor taken rudely from the practice of his own art. On the other hand, it is quite unreasonable to say, as some English critics have said, that the turning of Michelangelo to sculpture had been unfortunate, as depriving us of the greatest of Christian religious painters while giving us only a melo-dramatic sculptor. The truth is that this artist is the most perfect exemplar of that way of treating all fine art, of which form alone (pure and abstract and almost separated from its usual purpose, as that of description and narrative), is the subject studied and gives the effect sought. Everything else — truth of anatomy, expression of face, energy of pose and of apparent movement — is subordinated to the one important thing — the getting of form which would be splendid in the artist's eyes. If, then, we have to regret a frequent excessiveness and extravagance of design, it can only be said that the extraordinary energy and force of the man, driving him on to undertake more than mortal man could achieve even had he been (as Michelangelo was not), left to pursue his own course in peace, resulted as of necessity in frequent exaggeration in the very desire to give vigor and as yet untried combinations of form as shown in the human body posed singly or in elaborate groups.

After 1513, when Julius II. died, Michelangelo undertook a façade for the Church of St. Lorenzo in Florence. This front was never finished; but not long after he began the building of a new sacristy for this church, in which square room, very finely adorned with classical architectural forms, are the two remarkable tombs of the princes Lorenzo and Giuliano dei Medici. These monuments have each a seated statue of the prince in question, raised high above the sarcophagus; and on the lid of the sarcophagus two colossal reclining figures, in each case one man and one woman. The sculptures are not all completed. The extraordinary power of their modeling has made these monuments very famous in the modern world.

About 1535 Michelangelo settled finally in Rome, and from that time until his death was very much occupied as an architect in connection with the great Church of St. Peter. The building had been going on for many years, and different architects had successively changed the design, so that Michelangelo took up the work at that point where it became necessary to roof the central mass. This he did by means of the famous cupola which dominates the city of Rome and the country around, although the rounded shell of stone itself was not erected during his lifetime.

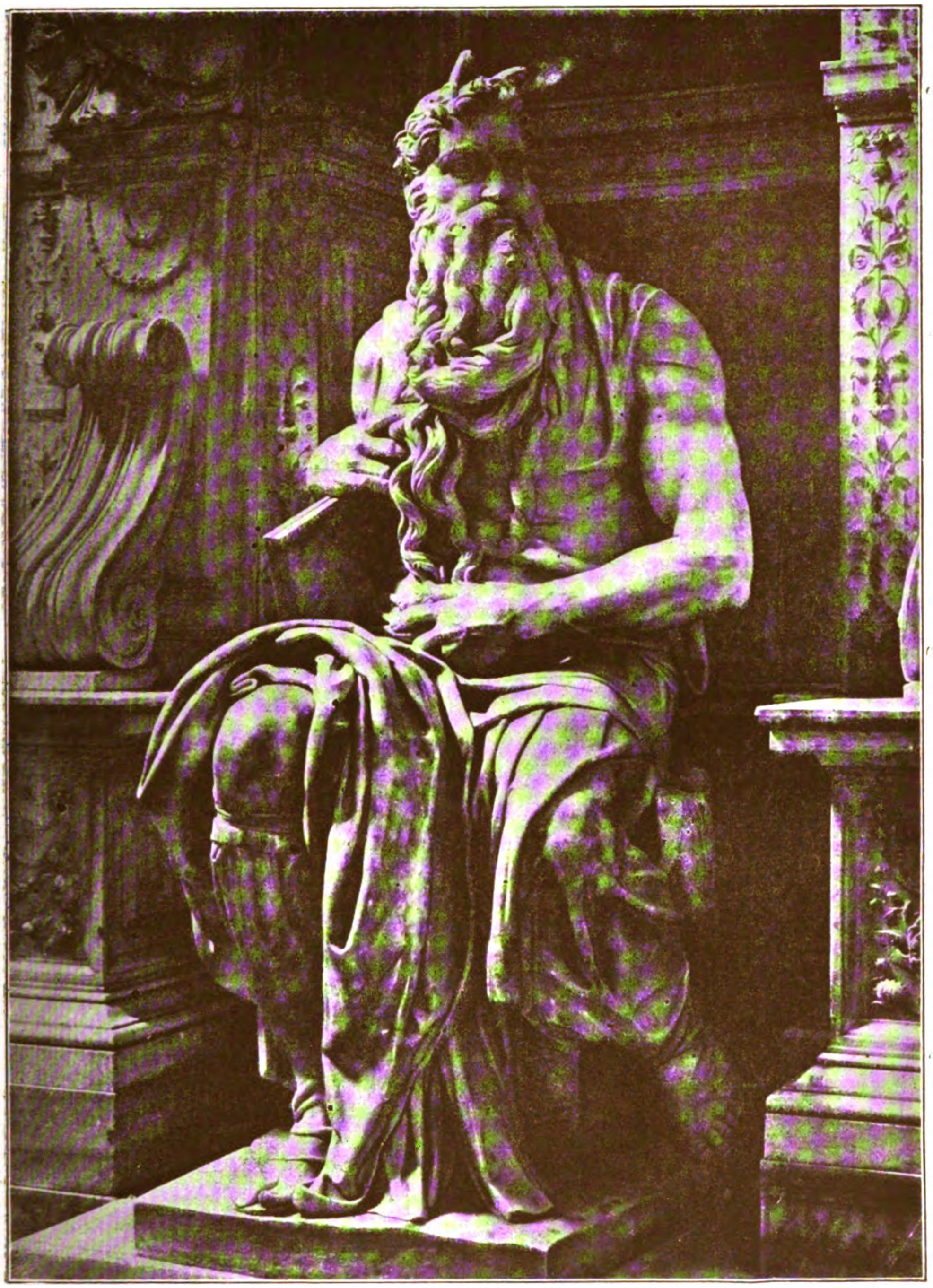
As an architect Michelangelo was not, on the whole, beneficial to Italy or to the art of the 16th century, because he had never, as a youth, studied construction or the use of details, and because his almost exclusive devotion to more elaborate and organic forms than those possible to architectural masses, prevented his designing such features as frontons and consols with gravity and simplicity. The architecture inspired by him, and more especially that produced by his immediate successors, ran to extravagance; and the worst period of Italian decorative art was to follow upon his own epoch of work. The sculpture of his later years is much less important and much less in quantity than might have been expected; but the work upon the church occupied his energies, and in 1535 he was appointed by Pope Paul III., architect, sculptor and painter to the papal palace, and he began work immediately upon the east wall of the Sistine Chapel. Here he painted that prodigious Last Judgment, filling all the wall above the altar, including the lunette, and up to the nearly semicircular vault. The picture is, like the ceiling paintings, entirely a study of the human body in vigorous action, and in highly studied pose. As a work of color, or even of light and shade, it is almost unrecognizable for what it was, as the smoke of the candles on the altar has caused very great changes in color, and has led to repainting, and because of certain painted additions made in the next century in order to disguise the complete nudity of the figures.

Throughout his life Michelangelo had been a writer of verse, and it is known that important sonnets of his were left by him. These, however, were edited in a destructive manner by his nephew, so much so that we have at the present day no certain knowledge, even, of what the poems were as they left Michelangelo's hand. This part of his intellectual life has been treated with great thoroughness by John Addington Symonds in his life of the artist. The frescoes of the Sistine Chapel have been peculiarly the study of Heath Wilson who, about the middle of the 19th century, had a scaffolding erected in the chapel and studied the paintings inch by inch; and who recorded his observations in a valuable book. Apart from these two books and the life by Harford, the best book on Michelangelo is the volume of the 'Gazette de Beaux-Arts,' published in 1876. This volume contains papers by the sculptor, Eugène Guillaume, the architect, Charles Garnier, and the competent writers, Charles Blanc, Paul Mantz, A. Mézières, and Anatole de Montaiglon.

RUSSELL STURGIS.

Michelet, Jules, zhül mēsh-lā, French historian: b. Paris 21 Aug. 1798; d. Hyères 9 Feb. 1874. He was educated at the Lycée Charlemagne and in 1821 became a professor there. After the revolution of 1830 he was appointed chief of the historical section in the Archives, and in 1838 professor of history at the Collège de France. He lost his offices by his refusal to take the oath of allegiance to Louis Napoleon, and thereafter devoted himself to his busy literary labors. His 'Histoire de France' (18 vols. 1833–67; new ed. 19 vols. 1879) is among the monumental productions of historical composition, and definitely established his fame. His 'Histoire de la Révolution' (1847–53; new ed.

MICHAEL ANGELO.



MOSES.

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1889) is a splendid specimen of eloquent writing, but hardly a great history. In all his historical writing Michelet has been criticized for unduly subordinating historical values to dramatic effect. But his descriptions are remarkably vivid, and his rendering of certain episodes is unsurpassed. Among his further writings are: ‘Précis de l'Histoire Moderne’ (1827); ‘Histoire Romaine’ (1831), and several volumes of polemics and of natural philosophy.

Michelet, Karl Ludwig, kärl lood'vig mē-shĕ-lā, German philosopher: b. Berlin 4 Dec. 1801; d. 16 Dec. 1893. He was graduated from the University of Berlin in 1824, and in 1828 was appointed to the professorship of philology and philosophy in the French gymnasium, which he held for 25 years. In 1829 he also became professor of philosophy in the University of Berlin. He devoted himself especially to the doctrines of Aristotle, and published ‘Die Ethik des Aristoteles’ (1827), an edition of the Nicomachean ethics with Latin commentary (1829–33), and a memoir entitled ‘Examen Critique du Livre d'Aristotle, intitulé Métaphysique’ (1836), which was crowned by the Academy of Moral and Political Sciences. From 1832 to 1842 he was engaged as one of the editors of Hegel's works, in illustration of whose system he wrote ‘Geschichte der letzten Systeme der Philosophie in Deutschland von Kant bis Hegel’ (1837–8); ‘Entwickelungsgeschichte der neuesten Deutschen Philosophie mit besonderer Rücksicht auf den gegenwärtigen Kampf Schellings mit der Hegelschen Schule’ (1843); and a controversial dissertation, ‘Schelling und Hegel’ (1839). His own standpoint and tendency are most decisively shown in his ‘Vorlesungen über die Persönlichkeit Gottes und die Unsterblichkeit der Seele, oder die ewige Persönlichkeit des Geistes’ (1841); and ‘Die Epiphanie der ewigen Persönlichkeit des Geistes’ (1844–52).

Mich'elson, Albert Abraham, American physicist: b. Strelno, Posen, Germany, 19 Dec. 1852. He came to the United States when a boy; was graduated at the U. S. Naval Academy in 1873; took graduate courses in physics in Berlin and Heidelberg, and in Paris at the Collège de France and the Ecole Polytechnique, between 1880 and 1882; and in the meantime had resigned from the navy to become professor of physics at the Case School of Applied Science, Cleveland, Ohio. From 1889 to 1892 he was professor of physics at Clark University, and since 1892 has been head of the department of physics in the University of Chicago. He is a member of many scientific societies and a contributor to scientific periodicals. His experiments at the Naval Academy in 1879 and at Cleveland in 1882 gave new figures for the velocity of light *in vacuo*. He made careful studies of the relative motion of ether and matter, and apparently proved that, though in general ether may have relative motion, within building walls, etc., it partakes of the motion of materials. About the same date (1886–7) his inferential refractometer made it possible to use wave-lengths of light as as a measuring unit; this discovery was put to concrete use by his measuring a metre in terms of cadmium light wave-length; this was done for the Paris International Bureau of Weights and Measures, with the result that the metre is no longer an arbitrary unit, since the original metre-long bar so carefully preserved in Paris, could easily be replaced at any time now that its length is known in terms of other units. This interferometer not only determines wave-lengths of red, green, and blue cadmium light, but separates lines less than one thousandth metre apart, and hence is a very delicate dividing machine. The echelon spectroscope, an arrangement of glass plates of equal thickness, but of surface area varying in arithmetical progression, was invented by Michelson in 1898; it is valuable for the study of the Zeeman effect. In 1907 he was awarded the Nobel prize in physics.

Michigan, one of the United States, admitted into the Union 26 Jan. 1837. It lies in the region of the Great Lakes, between lat. 41° 42′ and 47° 32′ N., and lon. 82° 24′ and 90° 31′ W. The State is divided into 83 counties. The capital is Lansing and the total population in 1910 was 2,810,173. (See *Population.*) The State has an area of 58,900 square miles including 1,470 square miles of water and 57,430 of land. It has a length of 305 miles from north to south and an average width of 200 miles. The State is practically surrounded by lakes and rivers; and is bounded on the north by Lake Superior; on the south by Indiana and Ohio; on the east by Lake Erie, Detroit Strait and River, Lake Saint Clair, Saint Clair River, Lake Huron and Saint Mary's River; on the west by Wisconsin and Lake Michigan.

Topography.— Michigan is sometimes called the Peninsular State, from its formation in two great peninsulas, the upper and the lower. The former has an extreme length east and west of 288 miles and a width of 164 miles; the latter has a length north and south of 277 miles and a width of 197 miles. Keweenaw and Saint Ignace peninsulas extend into Lake Superior. The upper or northern peninsula is mostly barren, rugged and rocky, although containing vast mineral wealth. The highest point in the State is a group of hills known as Porcupine Mountains, in the northwest part near Lake Superior. These mountains are 1,830 feet above the sea. From Keweenaw Point the famous mineral range extends westward into Wisconsin. These mountains form the watershed between the streams flowing into Lake Superior and Lake Michigan. The surface of the Lower Peninsula is generally level, broken in the southern portion by conical hills rising to an altitude not exceeding 200 feet. It is divided by a low undulating watershed running north and south, and rising at its highest point in the north about 800 feet above the lake surface, the larger portion of the State being on the west of this and gradually sloping toward Lake Michigan. The soil is of a varied composition and in large areas is very fertile, especially in the south. Among the 200 islands within the State boundaries are Isle Royale and Grande Isle in Lake Superior; Sugar Island, Encampment Island, Drummond Island, Bois Blanc and Mackinac in Lake Huron; and Beaver, Fox, and Manitou in Lake Michigan.

Climate.— In a State covering so wide a range of latitude, climatic conditions necessarily show large variations. The mean annual temperature varies from 40.4° in the Upper Peninsula to 46.9° in the southern part of the Lower Peninsula. The mean average temperature in July and August is 64.2° in the first named region, and

71.6° in the latter. In January and February, the mean average varies from 14.3° to 23.5°. The annual rainfall averages 28 inches. Owing to the proximity of the lakes, the climate of the southern peninsula is milder in winter and cooler in summer than in other parts of the country in the same latitude. In the northern part of the Lower Peninsula many attractive summer resorts have developed along the lake coast. At other places popular resorts have built up on account of the medicinal value of mineral springs, chief among these being Mount Clemens; while the waters of four mineral springs find a market.

Rivers and Lakes.— Along the lake coasts are numerous bays and inlets. Keweenaw, White Fish and the Big and Little Noquette bays are the principal indentations on the north; while the Grand and Little Traverse, Thunder and Saginaw bays indent the southern peninsula. The rivers are small, short and shallow. The most important are the Grand, flowing into Lake Michigan; and the Saginaw, flowing into Lake Huron; each of which is navigable for about forty miles. Among the other rivers may be mentioned the Au Sable, Thunder Bay, and Cheboygan, flowing into Lake Huron; Ontonagon and Tequamenon into Lake Superior; and the Saint Joseph, Kalamazoo, and Escanaba into Lake Michigan. Lakes abound throughout the State, over 5,000 in all, and no less than 175 are in the basin of the Kalamazoo River. These lakes are valuable sources of water supply, which is abundant throughout the State. The largest lakes are Houghton, Mullets, and Burts, in the northern part of the Lower Peninsula; and Manistique in the Upper Peninsula.

Geology.— The geology of the State represents every series known from the oldest strata to the carboniferous. Primary boulders are found over the entire surface, the northern part being principally of primitive origin, while Secondary deposits cover the entire southern peninsula. The Upper Peninsula exhibits Lower Silurian sandstones, limestones, copper and iron bearing rocks, corresponding to the Huronian system of Canada. The Mineral Range of Mountains is of eruptive or volcanic rock, with older strata tilted upon its side. Farther eastward are the long belts of the Lower Silurian, curving from Green Bay through the Saint Mary's Peninsula. The central portion of the southern peninsula contains coal measures and rocks of the permo-Carboniferous period. The coal-bearing area of about 5,000 square miles is in the neighborhood of Saginaw; but the coal is for the most part of inferior quality. The surface of the State is largely determined by glacial action, being covered with a sheet of till, in some places some hundreds of feet in thickness. The rivers are upon the drift surface.

Minerals.— Michigan possesses vast mineral wealth, especially in the copper and iron mines of the Upper Peninsula. The Calumet and Hecla and other famous copper mines are on Keweenaw peninsula; and furnish copper of a quality nowhere surpassed, and for some purposes unequaled. Until recently Michigan had the largest output of copper of any State, and still holds third rank, the product of 1909 being 227,005,923 pounds. In iron ore Michigan was also first among the States, until within a few years, when Minnesota has taken first place by a small margin. In 1908 the Michigan output was 8,839,199 tons, valued at $25,150,861. Some gold is found in the Upper Peninsula, and silver and lead in small amounts. In the Lower Peninsula the most important mineral product is salt, found in large quantities in the Saginaw Valley. The output is over 7,500,000 barrels from 250 wells, valued at $2,500,000, the largest amount from any State and one third of the total for the United States. In the same region (Bay and Saginaw counties) coal mining has been developed on a considerable scale, mainly since 1898. In 1910 this industry was in better condition than in most States. Brick, tile and other clay products are made easily and cheaply in many parts of the State, the total value of such products for 1908 being $1,728,790. Within recent years the manufacture of Portland cement has been developed on a large scale; and in 1901 there were ten works with a total product of 2,892,576 barrels, valued at $2,556,215. Building stone is found in many parts of the State; and in the Upper Peninsula this includes marble and other ornamental stone, such as agates, jasper, chalcedony, and chlorastrolites. As yet, however, a comparatively small amount is marketed, the total value of the annual output being $800,000, mostly in sandstone and limestone. Large deposits of gypsum are found in the Lower Peninsula near Grand Rapids. The annual output is 130,000 tons; and 20,000 tons of land plaster and 205,000 barrels of stucco are annually produced. Glass sand is found in the extreme southeast of the State; on the shores of Lake Huron grindstones are quarried; while still other minerals exist in less important quantities in various parts of the State.

Forests.— One of the most important sources of wealth and material prosperity to Michigan has been its abundant forests. Originally the Upper Peninsula and the northern half of the Lower Peninsula were covered with dense forests of conifers, consisting mainly of white pine. Farther south, hard woods were intermingled in larger proportion; while the southern part was mostly prairie. Besides white pine, the principal trees include basswood, maple, elm, sassafras, butternut, walnut, poplar, hickory, oak, willow, birch, beech, hemlock, witch-hazel, tamarack, cedar, locust, dogwood, and ash. The total forest area of the State, including stump land, is estimated at 38,000 square miles, or two thirds of the total area. Until after 1860 the production of lumber was relatively small; but by 1870 Michigan had gained first place as a lumber State, and maintained that position until 1900, when owing to the partial exhaustion of her resources she fell slightly behind Wisconsin. Michigan is, however, still the second State in lumber production. The development of this industry is shown in the following table:

Year	Establishments	Capital	Average number of wage earners	Wages	Value of products
1850	......	....	....	....	$2,464,329
1860	......	....	....	....	7,040,190
1870	1571	$26,990,450	20,058	$6,400,283	31,946,396
1880	1649	39,260,428	24,235	6,967,905	52,449,928
1890	2124	129,467,072	54,308	15,548,833	83,121,969
1900	1705	67,379,698	26,199	11,122,030	54,290,520

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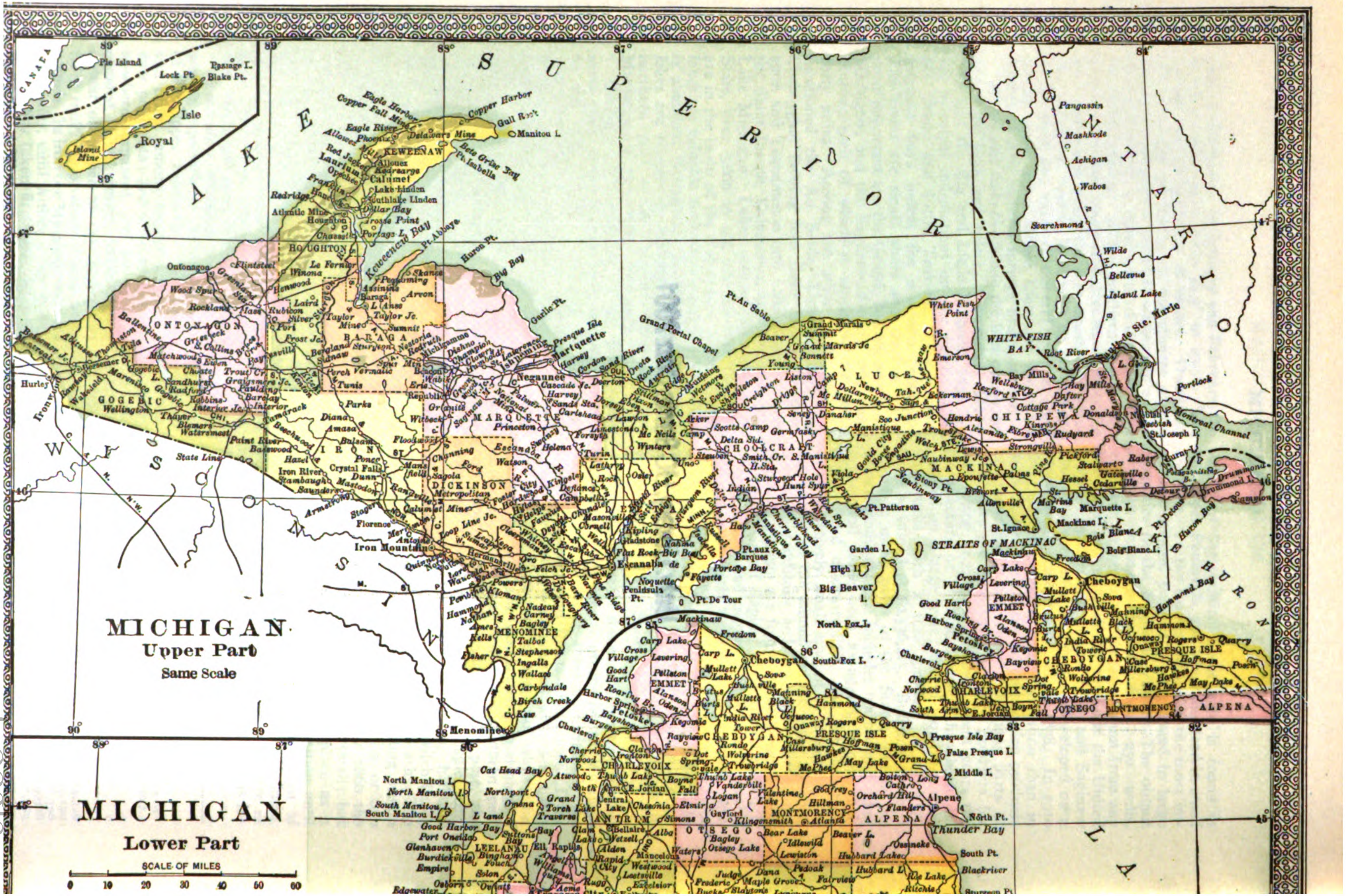
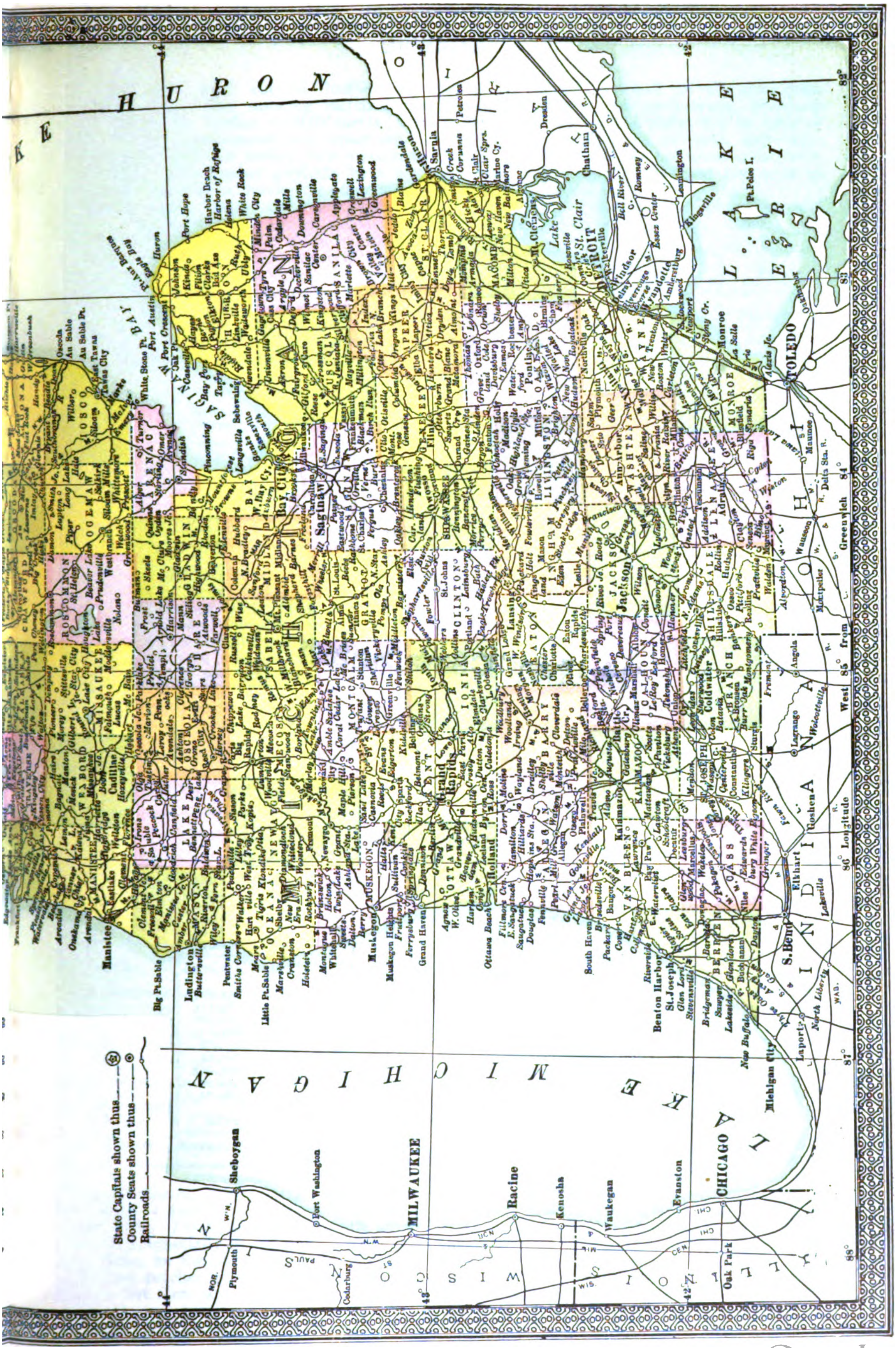

MICHIGAN
Upper Part
Same Scale
MICHIGAN
Lower Part
SCALE OF MILES
0 10 20 30 40 50 60
LAKE SUPERIOR
LAKE HURON
ONTARIO
WISCONSIN
CANADA
Isle Royal
Pie Island
Passage I.
Blake Pt.
Lock Pt.
Island Mine
STRAITS OF MACKINAC
WHITE FISH BAY
KEWEENAW
HOUGHTON
ONTONAGON
GOGEBIC
BARAGA
MARQUETTE
IRON
DICKINSON
MENOMINEE
DELTA
ALGER
SCHOOLCRAFT
LUCE
CHIPPEWA
MACKINAC
EMMET
CHEBOYGAN
PRESQUE ISLE
CHARLEVOIX
OTSEGO
MONTMORENCY
ALPENA
ANTRIM
LEELANAU
Manitou I.
Gull Rock
Copper Harbor
Eagle Harbor
Calumet
Houghton
Ontonagon
Marquette
Negaunee
Ishpeming
Escanaba
Menominee
Iron Mountain
Sault de Ste. Marie
Mackinac I.
Bois Blanc I.
Drummond I.
Mackinaw
Cheboygan
Petoskey
Charlevoix
Alpena
Thunder Bay
Big Beaver I.
Garden I.
North Fox I.
South Fox I.
North Manitou I.
South Manitou I.
Grand Traverse Bay
Pt. Au Sable
Grand Portal Chapel
Big Bay
Huron Pt.
Keweenaw Bay
Hurley
State Line
90° 89° 88° 87° 86° 85° 84° 83° 82°
47° 46° 45°


LAKE HURON
SAGINAW BAY
LAKE MICHIGAN
LAKE ERIE
Lake St. Clair
MICHIGAN
INDIANA
OHIO
ONTARIO
WISCONSIN
ILLINOIS
DETROIT
LANSING
TOLEDO
CHICAGO
MILWAUKEE
Grand Rapids
Saginaw
Bay City
Jackson
Kalamazoo
Racine
Kenosha
Waukegan
Sheboygan
Evanston
West 85 from Longitude
State Capitals shown thus
County Seats shown thus
Railroads

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In 1900, the total cut of lumber was 3,462,152,000 feet. The standing merchantable timber owned by lumber establishments was estimated to be 14,546,100,000 feet, which represents probably half the timber then remaining in the State. The lumber products have also been of great service in developing other industries in the State, notably the manufacture of furniture, which centres at Grand Rapids.

Agriculture.— This is the chief industry in Michigan. One third of the industrial population is engaged in agricultural pursuits; and the value of farm property is more than double the capital of manufacturing establishments, and nearly one half of the total assessed valuation of all property in the State. The development of farming may be seen in the following table:

YEAR	Number of farms	Acres in farms	Value of farm property	Value of farm products
1860.....	62,422	7,030,834	$190,371,098	....
1870.....	98,786	10,019,142	461,762,426	....
1880.....	154,008	13,807,240	574,242,654	$ 91,159,858
1890.....	172,344	14,785,698	647,938,255	83,651,390
1900.....	203,261	17,561,698	690,355,734	146,547,681
1910.....	206,376	18,913,000	*946,828,000	....

*Land, buildings, implements, and machinery.

The farm lands amount to about 50 per cent of the total area; and of this acreage 68 per cent is improved land. Most of the farming is in the Lower Peninsula. More than four fifths of the farms are cultivated by the owners; less than 5 per cent are operated by cash tenants, and but 11 per cent by share tenants. Cereals constitute the most important farm crops, contributing about 45 per cent of the total value of crops. Corn is the leading crop, wheat ranks next in value, and oats third. Hay and forage yield nearly one fourth of the total value of farm crops. Vegetables are raised in large quantities; and the State leads in the production of beans, peas, celery, chicory, and peppermint; is fourth in potatoes, and second in sugar beets. Fruit raising is a rapidly growing industry, especially in the southwestern part of the State, on the shores of Lake Michigan. Apples and peaches are the principal orchard products; but there are also large quantities of pears and plums, as well as a considerable amount of grapes. In small fruits, Michigan ranks second among the States for its crop of strawberries, blackberries, currants, and raspberries. According to the last census, the leading crops in Michigan for the year 1899 were as in the preceding table.

	Acres	Quantities.	Value
Corn	1,501,189	44,584,130 bu.	$17,798,011
Wheat	1,925,769	20,535,140 bu.	12,921,925
Oats	1,019,438	30,338,135 bu.	9,264,385
Rye	174,096	2,130,870 bu.	1,033,416
Barley	44,965	1,165,288 bu.	494,994
Buckwheat	55,669	605,830 bu.	306,311
Total cereals.....	4,726,126	99,359,393 bu.	$41,819,042
Hay and forage....	2,328,498	2,926,694 tons	$21,792,987
Potatoes	311,980	23,478,686 bu.	6,761,750
Dry beans..........	167,025	1,806,413 bu.	2,361,020
Dry peas..........	71,376	1,134,431 bu.	689,133
Other vegetables...	57,713	....	3,075,595
Sugar beets.......	40,247	215,333 tons	877,481
Orchard fruits.....	339,309	....	3,675,845
Small fruits.......	29,197	....	1,680,249
Grapes	10,465	....	503,268
Flowers and nursery products	2,124	....	899,231
Total, all crops...	8,091,791	....	$92,625,715

Live Stock.— The live stock interests are extensive and steadily increasing. Horses and dairy cows are the most important animals; and there are large numbers of other neat cattle, sheep, and swine. The production of milk for 1899 was exceeded only by New York, Pennsylvania, and Ohio; and the State also stands high in the output of butter and eggs. In the production of wool, Michigan ranks second only to Ohio among the States east of the Mississippi. Statistics of live stock and animal products at the 12th census are given in the preceding table.

	Number	Value
Horses	586,559	$35,907,555
Dairy cows..........	563,905	17,281,805
Other neat cattle....	812,503	10,883,451
Sheep	1,625,930	5,227,343
Lambs	1,121,679	1,935,321
Swine	1,165,200	4,588,898
Fowls	8,403,060	2,685,829
All live stock......	....	$79,042,644
Wool	12,202,844 lbs.	$12,202,844
Milk	309,617,046 gals.	16,903,087
Butter	60,051,998 lbs.	
Cheese	331,176 lbs.	
Eggs	54,318,410 doz.	6,104,462
Poultry raised.......	....	4,551,945
Animals sold and slaughtered	....	23,677,642
All animal products	....	$53,921,966

Manufactures.— While Michigan is not one of the most important States in the extent of its manufacturing industries, there has been a large growth in this direction during the last half century, and the State ranks tenth in the Union in the value of its manufactured products. The development is shown in the first table on following page.

The industrial development of the State has been marked by a steady diversification of its manufactures. The earliest, and for some time the only, industry of importance was the manufacture of lumber and timber products; and this still remains the leading manufacturing industry. With the decline of lumbering there has been some falling off in the value of crude lumber products; but the more intricate and specialized industries continue to develop. In particular the manufacture of furniture shows a large increase during the last decade; and Michigan ranks third among the States in this branch, as it does also in planing mill products. Second in importance among the groups of industries are those manufacturing food and kindred products, flour and grist mill products forming the principal branch of this group. Two minor food industries have received especial attention; the State ranks second in the production of beet sugar; and cereal and breakfast foods are manufactured in large quantities. Other industries of importance are iron and steel, other metals, car shops, chemicals and leather products. The table

	Number of establishments	Capital	Wage earners	Total wages	Cost of materials	Value of products
1850	2,023	$6,563,660	9,344	$2,717,124	$6,136,328	$11,169,002
1860	3,448	23,808,226	23,190	6,735,047	17,635,611	32,658,356
1870	9,455	71,712,283	63,694	21,205,355	68,142,515	118,394,676
1880	8,873	92,930,959	77,591	25,513,682	92,900,269	150,715,025
1890	12,127	262,412,240	148,674	54,982,906	154,521,918	277,896,706
1900	16,807	284,097,133	162,355	66,467,867	199,559,905	356,944,082
1909	9,159	583,947,000	262,111	153,838,000	368,612,000	685,109,000

below gives statistics in reference to the leading groups of industries for the year 1900:

	Number of establishments	Wage earners	Capital	Value of products
Lumber products (including furniture)	2462	50,711	$97,993,066	$92,241,218
Food products	1930	6,936	19,754,096	45,706,179
Iron and steel products	497	19,697	29,365,616	34,071,223
Other metal industries	556	3,975	6,235,490	25,556,939
Cars and carriages	393	14,057	19,427,093	28,465,773
Chemical products	272	7,509	20,606,900	20,017,746
Leather products	593	3,483	7,868,718	10,474,838

There has been a moderate localization of manufacturing in the southern half of the Lower Peninsula. Detroit, located conveniently for lake navigation at the point of union between the railroads of the United States and Canada, is the largest manufacturing centre in the State; and leads especially in the manufacture of stoves, pharmaceutical chemicals, and tobacco. Grand Rapids is conspicuous as one of the great furniture centres of the world. Battle Creek is noted for its breakfast foods. Shipbuilding is carried on at Port Huron, Detroit, and Wyandotte. At Belding there are important silk interests.

Commerce.— Michigan has four ports of entry, Detroit, Port Huron, Grand Haven, and Marquette; and its proximity to Canada would make these important centres of foreign trade under favorable conditions. But under existing tariff laws the volume of foreign commerce is comparatively small. For the fiscal year ending 30 June the total exports from these ports is about $30,000,000, and the total imports about $7,500,000. The internal and interstate commerce of the State is of vast and growing importance, especially the traffic on the Great Lakes. Lake commerce has been greatly promoted by improvements to navigation, and especially by the construction of ship canals at the falls of the Saint Mary's River, across the shallows at the head of Lake Saint Clair, and across the Keweenaw peninsula. The traffic through Saint Mary's Falls canal in a single year was 40,000,000 tons of freight, four times the volume of freight through the Suez Canal. The most important items in this traffic were iron ore, 23,966,724 tons; grain, 96,160,313 bushels; flour, 8,469,085 barrels; and coal, 4,309,899 tons. Arrivals and clearances of vessels at Detroit in a single year are about 5,000,000 tons.

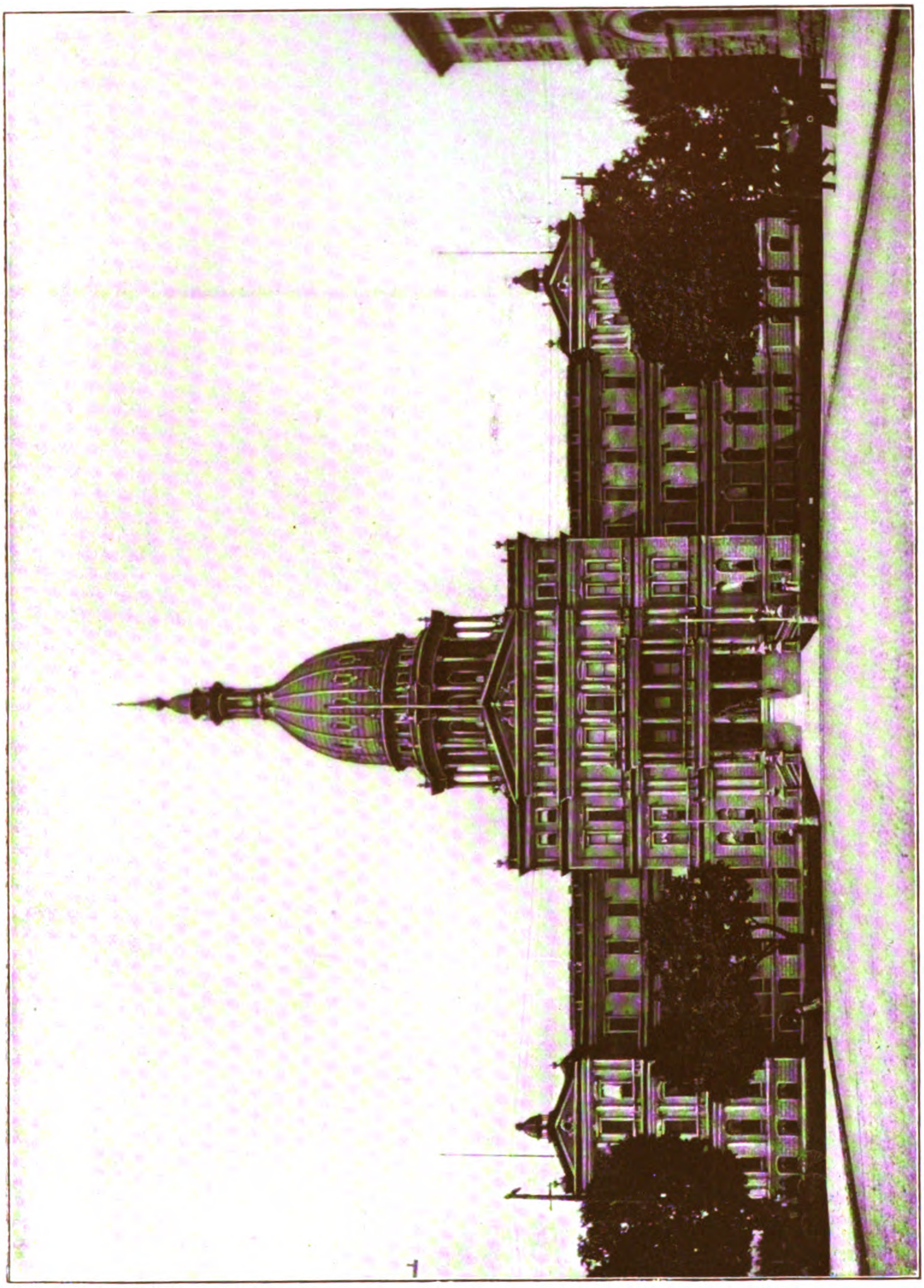
Railroads.—The first railroads in Michigan were begun by the State government in 1836; but these lines were sold in 1846 to private companies. There are about 8,500 miles of railroad in the State, extending to nearly every one of the 83 counties. The leading lines are the Michigan Central, the Lake Shore & Michigan Southern, the Chicago & Grand Trunk, and the Pere Marquette. The railroads of Michigan carry about 15,000,000 passengers, and 60,000,000 tons of freight; and their gross income is $50,000,000. There are about 30 electric street railway companies in the State operating 2,000 miles of track. This includes local roads in most of the principal cities, and also interurban lines which have been extended rapidly within recent years. From Detroit it is possible to go by electric railway as far as Kalamazoo, Port Huron, or Bay City; while additional lines radiate from Grand Rapids and other cities.

Banking.— The first bank in Michigan was organized in Detroit in 1817. When the State was admitted to the Union in 1837 a period of wildcat banking ensued, which soon brought disaster. The State banks as well as the national banks are now on a sound basis; and the former are slightly more important than the latter, as is shown in the following table for 1909:

	No. of banks	Depositors	Savings Deposits
National banks	97	130,549	$39,105,306.48
State banks	265	383,203	100,936,036.07
Savings banks	14	74,178	30,490,348.22
Private banks	102	19,059	3,905,944.26
Total	478	606,989	$174,437,635.03

The exchanges for the year ending 30 Sept. 1909 at the clearing houses at Detroit and Grand Rapids amounted to $849,058,700, an increase over the previous year of $74,075,770. The State has also a large number of savings banks and trust companies.

Government.—Michigan has 12 representatives in the lower house of Congress, and two senators. It forms part of the sixth federal judicial circuit; and is divided into two federal judicial districts and two internal revenue districts. The State has about 2,500 post-offices, 10 of the first class. The State legislature consists of a Senate of 32 members and a House of Representatives of 100 members, the whole membership being elected biennially. The regular session of each legislature begins on the first Wednesday in January of odd numbered years. The compensation of members is $3 per day and mileage. The governor is elected for a term of two years and receives a salary of $5,000 a year. Re-elections for a second term are frequent.



THE STATE CAPITOL AT LANSING.

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Other State officers are elected for the same term; and various commissioners and members of boards are appointed by the governor and senate. The supreme court consists of five justices, elected one every second year for ten years, at the spring election in April, when also are elected the regents of the State University. There are 38 State judicial circuits, each with one or more circuit judges, elected for a term of six years. County government is organized on the same plan as in New York, with a board of supervisors elected by townships and city wards. Sheriffs and other county officers are elected, in most instances for a term of two years. Township organization is unimportant, owing to the large number of villages and cities. There are 312 incorporated villages and 82 cities. Most of the latter are governed by special charters with nothing approaching a uniform system of organization. Amendments to the constitution are adopted on passing each house of the legislature by a two thirds vote, and afterward receiving a majority of the popular vote on the proposed amendment. Every 16 years the question of the general revision of the constitution is submitted to the electors. All male citizens of the United States who have resided in the State for six months, and in the ward or township for 20 days, are entitled to vote.

State Finances.— The first State Legislature authorized a loan of $5,000,000 for public improvements; and in 1861 there was still $2,316,328 outstanding. During the Civil War this debt was increased to $3,880,399; but was steadily decreased and practically extinguished by 1890. In 1898, a loan of $500,000 was made on account of the war with Spain; but by 1903 this debt was reduced to $43,000. For the year ending 1 July 1903, the revenues and expenditures of the State Treasury (omitting bookkeeping transfers from one fund to another) were:

Balance, 1 July 1902		$3,453,811
General taxes	$3,726,191	
Specific taxes (railroads)	3,441,705	
Sale of State lands	209,680	
United States government	100,594	
Miscellaneous	214,112	
Total ordinary receipts		7,692,284
U. S. government (war claims refunded)		385,152
Deposit accounts (temporary)		373,393
		$11,904,640
Total disbursements		7.387,535
Balance, 30 June 1903		$ 4,517,105

Since 1899 through the efforts of the State Tax Commission, the assessed valuation of property has been increased from $968,189,087 to $1,687,155,697 in 1910.

The taxation levied by the different administrative districts is about as follows:

State tax	$ 4,003,000
County taxes	3,373,000
Township taxes	5,873,000
Highway labor taxes	1,215,000
Village taxes	1,022,000
City taxes	10,512,000
Total	$26,000,000

Charities and Correction.—The State maintains five insane hospitals, at Kalamazoo (established 1848), Pontiac, Traverse City, Newberry, and Ionia, the last named for the criminal insane. These institutions hold property valued at about $4,000,000, the number of patients was 5,000, and the annual expense $1,150,000. There is also a home for the feeble-minded and epileptic at Lapeer, and a Soldiers' Home at Grand Rapids. There is also a State school for the deaf and dumb at Flint, a school for the blind and an industrial school for boys at Lansing, an industrial home for girls at Adrian, and a school for neglected and dependent children at Coldwater, the last named the first of the kind in the United States. Correctional institutions consist of State prisons at Jackson and Marquette, and a reformatory at Ionia, with a total of about 1,500 inmates. The expenditures for a single year are $245,000, and the receipts from prison industries $138,000. The indeterminate sentence has recently been adopted in Michigan. Each of these institutions is under the management of a separate board of unpaid trustees. An unsalaried State Board of Charities and Correction, appointed by the governor and senate, inspects both State and local institutions.

Education.—There are 8,000 school districts, 20,000 teachers and 8,500 school buildings, the property aggregating $25,000,000. Out of 712,544 children between 5 and 18 years of age, 529,352 were enrolled in the schools. There were 382 public high schools and 25 private schools. The total public school revenue is about $8,890,000; and $5,000,000 is paid in salaries to teachers and superintendents. Only 4 per cent of the population is classed as illiterate. The State maintains four normal schools, and three institutions for higher education,— the University of Michigan (q.v.) at Ann Arbor, the Agricultural College at Lansing, and the College of Mines at Houghton. There are nine private colleges in the State, at Adrian, Albion, Alma, Battle Creek, Detroit, Hillsdale, Holland (Hope College), Kalamazoo, and Olivet. Besides the State library at Lansing and the University library at Ann Arbor, there are large public libraries in Detroit, Grand Rapids, and other cities. The newspaper press is well developed. The first was established at Detroit in 1817; and there are now over 800 newspapers and periodicals, of which 80 are issued daily, 600 weekly and 85 monthly.

Churches.— The Roman Catholic Church has the largest number of communicants. Of the Protestant denominations, the Methodist Episcopal Church is first, and the Lutheran second; while the Baptist, Presbyterian, Congregational, and Protestant Episcopal follow in the order named; and the German Reformed, United Brethren, Disciples of Christ, and Adventists have also considerable numbers. There are about 5,000 church organizations, with 4,000 buildings and 575,000 members, and property valued at $19,000,000.

History.— Some reminders of prehistoric races are to be found in Michigan in deserted copper mines at Isle Royale, and other signs of human occupation, assigned to the mound builders (q.v.). The Indians who occupied the region in historic times were mostly Hurons or Wyandots, who were in almost constant conflict with the Iroquois confederacy. The first white men who visited the Michigan country came from the French settlements in Canada by way of the Ottawa River, early in the 17th century. It is known that Jean Nicolet, vanguard of the

Jesuit missionaries, penetrated as far as central Wisconsin in 1634; and it is supposed that other explorers had come still earlier. The first permanent white settlements were Jesuit missions established by Father Marquette at Sault Ste. Marie and Michilimackinac in 1668 and 1670. A French colony was founded at Detroit in 1701 by Antoine de la Motte Cadillac (q.v.). During the French and Indian war, these settlements in Michigan were surrendered to the British (1760) as part of Canada. In 1763 the Indians rose under Chief Pontiac and after the massacre of Mackinaw laid siege to Detroit for nearly a year, but were finally defeated. The Quebec Act (q.v.) of 1774 for the government of Canada applied to Michigan. During the Revolution the British officers at Detroit encouraged Indian expeditions which harassed the settlements in Ohio and Kentucky; and even after the peace of 1783 there was much trouble with the Indians until 1795, when they were brought to terms by General Wayne. By the treaty of peace, they ceded large tracts of land in Michigan to the United States. It was not until 1 July 1796 that the British troops surrendered possession of Detroit to the United States. The Michigan settlements then came under the government of the Northwest Territory. In 1802 the country was made a part of Indiana Territory; and in 1805 the Lower Peninsula was organized as Michigan Territory, with General Hull as governor. During the War of 1812 Detroit and Frenchtown were surrendered to the British, and at the latter place many prisoners and inhabitants were massacred by the Indians (See FRENCHTOWN MASSACRE). After the battle of Lake Erie (1814) the United States again came into possession of Michigan; and Lewis Cass began his long career as governor of the territory, which continued until 1831. With the final abandonment of Michigan by the British, the Indians acknowledged American supremacy; and from 1814 to 1835 ceded large tracts of land to the United States. The completion of the Erie Canal across New York State in 1825 opened a new route to Michigan, and population increased rapidly. In 1837, after a bitter struggle over the southern boundary, Michigan was finally admitted to the Union, the Upper Peninsula being added to the State as compensation for the loss of the strip claimed from Ohio.

The new State at once undertook to build three lines of railroad across the Lower Peninsula; but the plans failed and in 1846 the roads were sold to private corporations. In 1847 the State capital was removed from Detroit to Lansing. A second State constitution was adopted in 1850. During the Civil War Michigan sent her full quota of troops to the front; and many of them became famous as soldiers and sailors. Austin Blair was governor during the war period. The State had prohibited the sale of liquor in 1855; but in 1876 the prohibition law was repealed, and a license tax substituted, which has since been raised to a high figure. In 1881 the United States ship canal around Saint Mary's Falls was completed, paving the way for the rapid development of the mining resources of the Upper Peninsula. In 1889 the Australian ballot was adopted. The question of a general revision of the State constitution was voted on in 1892, and again in 1898; but on both occasions failed to secure the required vote. Many amendments to the constitution have, however, been adopted from time to time. In recent years the most important legislation has been that dealing with taxation, especially of corporations. In politics Michigan was Democratic with the exception of two elections until 1854; and it has been Republican since, with but three exceptions — in 1882 and 1883 fusion Democratic-Greenback tickets, and in 1890 the Democratic party were successful. Among the leading Michigan men in public life may be noted: — Lewis Cass, who after his long service as governor of the territory, filled positions in the cabinets of two Presidents, was senator for two terms (1845-57) and a candidate for President of the United States; Zachariah Chandler, senator for three terms (1857-75), and secretary of the interior; James V. Campbell, justice of the Supreme Court from 1858 until his death in 1890; and Thomas M. Cooley, justice of the Supreme Court from 1864 to 1885, and chairman of the Interstate Commerce Commission.

Population. — In 1810 the population of Michigan was 4,762; (1830) 31,639; (1840) 212,267; (1850) 397,654; (1870) 1,184,059; (1890) 2,093,890; (1900) 2,420,982; (1910) 2,810,173. The rapid settlement began after 1830; while since 1870 the increase has been at about the same rate as the United States as a whole, and during these 30 years Michigan has been the ninth State in population. The early settlers were largely from New York and New England. Since 1850 there has been a large immigration of foreigners, mostly Canadians and Germans; while there have also been considerable numbers from Holland, Ireland, and Poland. It 1900 the total foreign born population was 521,653, a larger proportion than in any other State in the Northwest Territory, except Wisconsin. Of those born in the United States 831,653 had one or both parents of foreign birth, leaving less than half (43 per cent) of the population born of native parents. Most of the population is in the Lower Peninsula; and only 261,362 (about one ninth) are in the Upper Peninsula. Urban population is about the same proportion in Michigan as in the United States as a whole; 60.7 per cent of the population live in the country districts, and 31 per cent in cities of over 8,000. The principal cities are Detroit, 285,704; Grand Rapids 112,571; Saginaw, 50,510; Bay City, 45,166; Jackson, 31,433; Kalamazoo, 39,437; Muskegon, 24,062; Port Huron, 18,863; Battle Creek, 25,267; Lansing, 31,229; and Ann Arbor, 14,817. Other cities of importance are Manistee, Ishpeming, Flint, Menominee, West Bay City, Sault Sainte Marie, and Marquette.

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Michigan, Lake, in the northern part of the United States, the second in size of the Great Lakes (q.v.), and the largest body of fresh water lying wholly within the United States. It is bounded on the north and east by the State of Michigan, on the south by Indiana, and on the west by Illinois and Wisconsin. Its outlet is Straits of Mackinac, through which its waters flow into Lake Huron (q.v.). The Mississippi is supposed to have been its outlet, in ancient times; and now the Lake is connected with this river by means of the Chicago Drainage Canal (q.v.) and the Illinois and Michigan Canal. Lake Michigan is a most important part of a great water system which furnishes transportation to the ocean for an extensive grain-growing and lumbering region. The Lake is 581 feet above sea level; its length from north to south is about 300 miles; the average width, 75 miles, the average depth 870 feet; area, 22,450 square miles. It is subject to violent storms, which are most destructive in the late autumn months. A lunar tidal wave shows itself in a slight degree. The shore-line of the southern part of the Lake, east and west, is regular, but that of the northern part, east and west, has a number of indentations many of which form good harbors. At the mouths of rivers which flow into the Lake there are good harbors. Nearly the whole extent of coast is low, most of it sandy; the Michigan coast has some high bluffs and considerable rocky shore-line. Green Bay on the west, indenting Wisconsin, is the largest bay, and Grand Travers Bay, on the east indenting the coast of Michigan is the next in size. Another important inlet on the east is Little Travers Bay. Big Noquet and Little Noquet are inlets from Green Bay. The chief harbors, which are formed by mouths of rivers, are Chicago, Milwaukee, and Grand Haven. Escanaba and several other good harbors are on the shores of Green Bay (q.v.). There are few islands in the southern part of the Lake, all small and near the coast. At the entrance to Green Bay there is a group of islands, the largest of which is Washington. The Manitou (q.v.) group, in the northern and northeastern part of the Lake, has several good-sized islands; the largest, Beaver, is about 52 miles long.

The chief rivers which flow into the Lake are the Ford, Escanaba, and Manistique from the north; the Manistee, Pere Marquette, Muskegon, Grand, Kalamazoo, and St. Joseph from the east. The Fox and the Menominee enter the Lake through Green Bay.

The chief cities on the Lake are Chicago in Illinois, and Milwaukee in Wisconsin. Other important cities are Kenosha, Racine, and Manitowoc (Wis.), Manistee, Ludington, and Grand Haven (Mich.), and Michigan City (Ind). The navigation on Lake Michigan is most extensive and important. In the upper waters, or the southern part, navigation continues nearly all the year, but in the northern part navigation is closed about four months on account of the ice in the Straits of Mackinac. Large shipments of lumber are sent by way of the Lake from northern Michigan and Wisconsin to Milwaukee and Chicago, and a vast amount of the wheat and corn of the Mississippi Valley is sent east through Chicago and over Lake Michigan. The fisheries of the Lake are most important. The lake trout and whitefish of Lake Michigan are sent, fresh and canned, to all the large markets of the vicinity and to the Eastern markets.

The early missionaries and traders traversed the waters of this Lake. In 1634, Jean Nicolet, an agent of Champlain (q.v.), visited the northern part of the Lake, entered Green Bay, and partially explored the Fox River. Father Marquette (q.v.) visited this Lake and established mission stations on its shores. La Salle (q.v.) and Father Hennepin (q.v.) in 1679 made their famous voyage on this Lake, and La Salle built a fort at the mouth of the St. Joseph River.

Michigan, University of, chartered in 1837, and first opened at Ann Arbor in 1841. It is a part of the public educational system of the State, and is under the control of a board of regents, elected for eight years by popular vote. The law of 1837 establishing the University provided for three departments, namely, Literature, Science and Art, Law and Medicine. The curriculum has since been enlarged, till the organization now includes seven departments: (1) Literature, Science and Arts; (2) Engineering; (3) Medicine and Surgery; (4) Law; (5) The School of Pharmacy; (6) The Homœopathic Medical College, and (7) The College of Dental Surgery. The Department of Literature, Science and Art offers courses in language and literature, history, philosophy, science, and the liberal arts, and includes a graduate school; the degrees conferred are bachelor of arts, master of arts, doctor of philosophy, and doctor of science. The Department of Engineering offers courses in civil, chemical, mechanical, electrical, and marine engineering, and confers the degrees of bachelor of science, master of science, and civil engineer, mechanical engineer, end electrical engineer. Other degrees conferred by the University are as follows: Doctor of medicine in the Department of Medicine and Surgery, and in the Homœopathic Medical College; bachelor of laws and master of laws in the Department of Law; pharmaceutical chemist, also bachelor of science and master of science (in pharmacy), in the College of Pharmacy; and doctor of dental surgery and doctor of dental science in the College of Dental Surgery.

There are summer sessions in the departments of Literature, Science and Art, of Medicine, and of Law.

The regulation of the affairs of each department is in the hands of the faculty of that department; there is also a University Senate which considers matters of common interest. The standard of scholarship at the University is high, and it has long ranked among the foremost of State universities. It is distinguished as a pioneer in adopting the principle of co-education, being opened to women in 1870, and giving them equal privileges in all respects; this system has proved very successful since the first, and has never incurred serious adverse criticism. The dormitory system adopted at first was discarded early in the history of the institution, and the University now has no dormitories and no commons. Besides the halls and laboratories of the different departments, the important buildings are the library, the museum, the main observatory, and the two gymnasiums, one for men, and one for women. The University has a number of valuable collections in natural history, archæology, ethnology, materia medica, anatomy, and the industrial and fine arts; in the library building is the Chinese government exhibit at the New Orleans Exposition, presented to the University in 1885. The general library in 1903 numbered over 130,000 volumes, not including pamphlets; special libraries also belonging to the University are the medical library (12,000 volumes), the law library (19,600 volumes), the homœopathic library, and the dental library; of these, the two medical libraries are shelved in the general library building; the other two are in the buildings of their respective departments. The main observatory, erected by the citizens of Detroit and known as the Detroit Observatory, contains a meridian circle constructed by Pistor and Martins of Berlin, and a refracting telescope with an object-glass of 13 inches diameter; there is also a small observatory near this main building, containing a 6-inch equatorial telescope. Two hospitals are connected with the University, one under the direction of the Department of Medicine and Surgery, the other under the charge of the Homœopathic Medical College; with each of these is connected a training school for nurses. Ample provision is made for physical culture and athletics; besides the two well-equipped gymnasiums, already mentioned, there is an athletic field of 30 acres; the general supervision of athletic sports is vested in a board of control of nine members, on which the faculty is represented by five members chosen from the University senate, and the students by four members chosen by the directors of the Students' Athletic Association. Important among student organizations is the University Oratorical Association, established by the students of the Department of Literature, Science and Art to foster an interest in oratory and debate; this association is affiliated with the Northern Oratorical League, composed of similar associations of the universities of Iowa, Minnesota, Wisconsin, Chicago, and Oberlin College and Northwestern University; and with the Central Debating League, in which the universities of Chicago and Wisconsin, and Northwestern University are also represented. In 1903 the total income was $741,000, including the State appropriation; the fees to students are small, being somewhat less for residents of the State than for non-residents. In 1910 the number of students was 4,755; not including the pupils who attended the summer session. The president is H. B. Hutchins.

Michigan City, Ind., city in Laporte County; on Lake Michigan, and on the Chicago, I. & L., the Michigan C., and the Lake E. & W. R.R.'s; about 40 miles east of Chicago. The place was visited frequently in the 18th century by missionaries, explorers, and traders, but the first permanent settlement was made in 1833. The incorporation was made in 1837. It has excellent transportation facilities which contribute to its commercial and industrial growth. Its chief manufactures are hosiery, knit underwear, chairs, lumber, railroad cars, and furniture. It has a large trade in iron ore, salt, lumber, and farm products. It has the Northern Indiana State Prison, a United States life-saving station, and on the lake front a park. Its educational institutions are a high school, public and parish schools, and a public library.

The city is governed under a charter of 1867, since amended, which provides for a mayor, elected biennially, and a common council. The administrative officials are elected by the council or appointed by the mayor subject to the approval of the council. The waterworks are owned and operated by the city. Pop. (1890) 10,776; (1900) 14,850; (1910) 19,027.

Michigan College of Mines, at Houghton (q.v.) in the State of Michigan, was founded in 1885 and opened in 1886. The school is located in the midst of the mining region of the State, thus giving the students exceptional opportunities for observation and study. Practical work in mine surveying and mining is carried on for five weeks, forty-five hours each week. The first two weeks are devoted to surveying and mapping a mine in the "copper country" or in the iron mining district; the last three weeks are given to the examination of mining methods, and to making sketches of mines in the vicinity. The courses of study lead to the degrees of Bachelor of Science and Engineer of Mines.

The school is well equipped with all necessary apparatus. The metallurgical and assay laboratory is a brick building; and the ore-dressing building, or stamp mill, is a wooden building. A reverberatory roasting furnace stands near the mill.

Michigan State Agricultural College, chartered in 1855, and opened in 1857, situated at Lansing. It was the first institution for agricultural education established in the United States. The Michigan State constitution provided that "The legislature shall as soon as practicable provide for the establishment of an agricultural school." In 1850 the legislature petitioned Congress for a grant of land for an agricultural college within the State, but no attention was paid to this petition. In 1855, however, the legislature appropriated land and money for such a college, and located it on a farm of 684 acres. From that time until 1862 the college was supported by State appropriations; and in that year received control of the Federal land grant. The courses offered in the college include the full four years' courses in agriculture, mechanical engineering, and domestic science; and short courses (varying from four to twelve weeks) in chemistry, beet sugar production, cheese making, dairy husbandry, creamery management, live-stock husbandry, and fruit culture; graduate work is also provided for. The college organizes Farmers' Institutes throughout the State, which are under the supervision of members of the faculty; in 1909, 200 institutes, with an attendance of 90,000, were held. The experiment station is also connected with the college, and receives a separate Federal appropriation of $15,000 annually. Women are admitted to all courses, but form a small proportion of the graduates. The farm consists of about 684 acres, and the buildings are valued at $440,000. The library in 1910 contained 33,000 volumes. The income for that year was $450,000; the students numbered 1,500, and the faculty 110.

Michipicoten, mĭsh-ĕ-pĕ-kō'tĕn, a bay in the western part of the province of Ontario, in Canada. It is an arm of Lake Superior, on the northeast shore; about 100 miles north of Sault Ste. Marie. At the entrance to the bay is Michipicoten Island.

Michoacan, mē-chō-ä-kän', Mexico, a state, on the Pacific Ocean; bounded on the north by the states of Guanajuato and Jalisco, on the east by Mexico, on the south by Guerro and the Pacific, and on the west by the Pacific, Colima, and Jalisco. Area, 22,874 square miles. Two railroad lines cross the state. The surface generally is mountainous; in the north and south are some flat lands. The volcano of Jorullo is in the southwest. The largest drainage streams are Las Balsas and Lerma on the boundary, and the Tepalcatepec. There are a number of lakes within the state limits, the largest of which is Cuitzeo. Except where the lands are low the climate is healthful. The soil is fertile; the principal crops are sugar, tobacco, vanilla, wheat, rice, and tropical fruits. Considerable attention is given to stock-raising, and mining is carried on to some extent. The minerals are valuable. The capital is Morelia. Pop. about 40,000; of State, about 1,000,000.

Mickey, John Hopwood, American politician: b. near Burlington, Iowa, 30 Sept. 1845; d. 2 June 1910. He was educated in the Iowa Wesleyan University, and in 1863–5 served in the Iowa cavalry in the Civil War. He engaged in banking in 1879 and was a member of the Nebraska legislature in 1881–2. In 1902 he was elected governor of Nebraska.

Mickiewicz, mĭts-kē-ĕv'ĭH, **Adam Bernard,** Polish poet: b. Novogródek, Lithuania, 24 Dec. 1798; d. Constantinople 26 Nov. 1855. He was educated at the University of Wilna, where he became affiliated with several of the leaders against Russian control. His first volume of poems appeared in 1822 and stamped him the greatest poet of his country. Implication in political affairs caused his banishment to Russia in 1824, but in 1828 permission to leave Russia was granted him and he traveled in Germany and Italy, and in 1834 he went to Paris, where, in 1840, he became professor of Slavonic language and literature in the Collège de France. Among his works are: 'Conrad Wallenrod' (1828); 'Crimean Sonnets' (1826); 'The Books of the Polish People and of the Polish Pilgrimage' (1832); 'Pan Tadeusz' (1834); etc. See L. de Loménie, 'Galerie des Contemporaines.'

Mickle, mĭk'l, **William Julius,** Scottish poet: b. Langholm, Dumfriesshire, Scotland, 28 Sept. 1735; d. Forest Hill, near Oxford, 28 Oct. 1788. He removed to London in 1764, and in 1775 appeared his principal production, a translation of the 'Lusiad' of Camoens, with a historical and critical introduction, including a life of Camoens. His poetical works were published collectively, with memoir by Sim, in 1806. Among the best of Mickle's poems is the ballad of Cummor Hall, which has attained additional celebrity as having suggested to Sir Walter Scott the groundwork of his novel of 'Kenilworth.' The popular song, 'There's nae Luck about the Hoose,' has been claimed for him; others ascribe it to Mrs. Jean Adams, schoolmistress, near Greenock.

Micmacs, mĭk'măks, a tribe of American Indians. See ALGONQUIAN.

Microbe (Greek μικρός, little; βίος, life), a microscopic organism; applied particularly to bacteria, and more especially to the pathogenic forms. See BACTERIA.

Mi'crocosm and Macrocosm. Among the ancients a belief prevailed that the world or cosmos was animated, or had a soul. This theory led to the notion that the parts and members of organic beings must have their counterparts in the members of the cosmos. The natural philosophers of the 16th century took up this theory in a somewhat modified shape, and considered the world as a human organism on the large scale, and man as a world, or cosmos, in miniature; hence they called man a microcosm (Greek, «little world») and the universe itself the macrocosm («great world»). Heylin gave the title 'Microcosmus' to a work on cosmography in 1621.

Microcos'mic Salt, used in blowpipe analysis; prepared by mixing concentrated solutions of phosphate of soda and chloride of ammonium. It has the composition $NaNH_4HPO_4, 4H_2O$.

Microles'tes. See PLAGIAULACIDÆ.

Mi'crolite (Greek, «small»), a native pyrotantalate of calcium, containing fluorine, and also niobium, and various other bases. The formula has not yet been satisfactorily determined. Microlite crystallizes in octahedral forms belonging to the isometric system, and the crystals are often very small. It was first found at Chesterfield, Mass., where the crystals were so minute as to suggest the name «microlite.» Excellent crystals as much as an inch in diameter have since been found in Amelia County, Va., as well as imperfect ones weighing as much as four pounds. The mineral is usually yellow or brown in color, with a resinous lustre, a hardness of 5.5, and a specific gravity of from 5.5 to 6.1.

Microm'eter, an instrument for measuring minute angles and distances. The «double-image micrometer» is of importance in measuring the diameter of a celestial object; it is an eye-piece containing two halves of a lens, each half being movable by a micrometer screw (q.v.) in a direction parallel to the common diameter. When the halves form one lens the heads of the screws indicate zero. In making an observation of the diameter of a heavenly body the half-lenses are so moved that the image formed by one of them of one limb of the body coincides with the image of the opposite limb formed by the other half-lens; the readings of the screw-heads determine the apparent diameter of the body.

Micrometer Screw, in optics, a screw attached to instruments for exact measurement of very small angles. The great space through which the lever of the screw passes, in comparison with the longitudinal motion due to the pitch, affords the means for a positive motion which is imperceptible on the object moved, though appreciable in its results.

Micron, mī'kron (Greek, «very small»), a unit of length equal to the millionth part of a metre, or the 25,400th part of an inch. It is much used among physicists in connection with precise measurements, and has been officially sanctioned by the International Commission of Weights and Measures. The Greek letter μ is used as its symbol. Thus «47 μ» is read «47 microns.» The names «bicron» and «tricron» have been proposed, respectively, for the billionth and trillionth part of a metre, but they have not been generally adopted, and probably will not be. Etymologically, at least, they are monstrosities.

Micronesia, mī-krō-nē'shĭ-a̤, the name given to a large number of islands in the Pacific Ocean, the natives of which have a light skin as distinguished from Melanesia (q.v.), the inhabitants of which are dark-skinned. The islands extend southward from Japan to New Guinea, the chief groups comprising the Gilbert Islands, Marshall Islands, Carolines, Pelew Islands, and Ladrones (qq.v.).

Mi′crophone, an ingenious instrument, the invention of Professor Hughes (1878), whereby minute sounds can be transmitted in an intensified manner by means of electricity, the whole arrangement consisting of a transmitter and a receiver with a small voltaic battery and wires in circuit. Not only can ordinary sounds be transmitted, but musical sounds, singing, breathing, and conversation can be readily transmitted. And not only are sounds transmitted, but slight sounds are transmitted greatly increased in volume, the gentle touch of a feather or a camel's-hair pencil reaching the ear like the rasping of a file, while the scratch of a quill-pen in the act of writing is augmented to a loud noise. Even the tramp of a fly is distinctly audible.

Microsau′ri, an order of *Prosauria*. See HERPETOLOGY.

Microscope, an optical instrument by which objects are so magnified that details invisible or indistinct to the naked eye are clearly observed. In the ordinary microscope the magnifying power is interposed directly between the eye and the object, in the manner of a magnifying glass; and although the power may consist of several lenses, they combine as one.

The microscope was invented between 1590 and 1609 — the honors being divided between Hans and Zacharias Janssen, two Hollanders, and that greatest of early opticians, Galileo. From its early form, consisting simply of a double or plano-convex object lens with an eyepiece of a single convex lens to magnify the image, it developed by gradual stages until the latter part of the 18th century, without becoming much more than a toy for the amusement of the dilettante. As a matter of fact nearly every form of accessory which is in use at the present time was devised and used in some form, but the desire for the ornamental and extraordinary rather than the practical was everywhere manifest. With the awakening of general interest in scientific investigation, the microscope began to be used as a tool to accomplish heretofore impossible results. This led to more practical forms of construction, and at last to their production in large quantities and at a cost which placed them within the reach of laboratories and individuals. Among the early American pioneers in the optical improvement of the microscope, the names of Robert Tolles and the two Spencers stand prominent. By their extraordinary manual skill and knowledge of optical principles, they succeeded in producing lenses which, in the case of one by Tolles had a focal length of 1-75 inch, the highest power objective which has ever been constructed. The resolving power of microscope lenses was greatly increased and the problems of their manufacture materially simplified by the invention by Tolles of his “duplex front” objective, a construction which was voted impractical by the experts of the time, but which has since superseded all others in the construction of high power lenses.

The microscope is used as a necessary accessory in a large number of the sciences and in many industries. It is, primarily, the assistant of the teacher of biology, botany, bacteriology, histology, pathology and the allied branches of science. The medical profession employs it in the examination of the urine, blood and of cancerous and tumorous growths, as well as in searching for the parasites of the body, fungi which infest the hair and skin and for diagnosing febrile diseases. For the examination of steel, iron and other metals to determine their intimate structure, the microscope is extensively used. Its use for the detection of adulterations in foods, drugs, paints, earths, starches, and many other substances is often the only effective method of working. The bureau of animal industry of the United States Government depends wholly on the microscope for the detection of living parasites in the flesh of animals slaughtered for food. The microscope is used in many industries for counting fine lines, threads, and fibres, and for determining the physical structure of cements, emulsions and other substances. The finest possible measurements of space are made with the microscope to which a filar micrometer is applied, and with it the rate of growth in plants is determined.

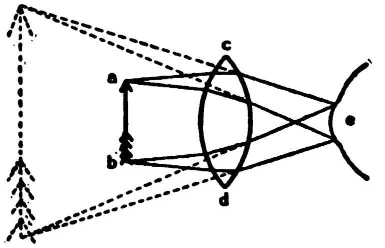

FIG. 1.

Microscopes are divided into two classes — simple and compound, the former being confined to limited magnifications, rarely exceeding 20 diameters, whereas the latter may give as high as 4,000 diameters magnification. In the simple form the eye views the object directly (Fig. 1), whereas, in the compound form an enlarged image is formed by one lens, which image is magnified by another lens or pair of lenses, at the same time reversing it so that what is right in the object is left in the image. (Fig. 2.) A short focus positive lens becomes a simple microscope when used for viewing an object; its usual form is that of the Pocket Magnifier, and although generally consisting of more than one lens, either for improving its quality or to obtain a variety of powers, it always remains optically simple. The most simple forms are one or several single convex lenses, the latter offering a variety of foci. These lenses have two defects, one, chromatic aberration, which fringes the images with the colors of the spectrum, most noticeably red and blue, the other, spherical aberration, which is most noticeable by the increasing lack of distinctness toward the edge of the field. Improved forms are constructed to overcome these defects. The most simple of these is the Coddington, originally a section of a sphere, but as generally made, a thick double convex lens with a circular groove which acts as a diaphragm. The achromatic lens when composed of three lenses (triplet), two concave convex flint glass lenses enclosing and cemented to a double convex crown glass lens, is the best form. These are usually placed in a folding mounting for pocket use. The simple microscope is also made in more complex form for dissecting purposes, a mechanical construction, more or less elaborate, being added, which provides adjustment for the lens in relation to the object, a platform or stage for the latter, and a mirror for reflecting light to illuminate the object. (Fig. 3.)

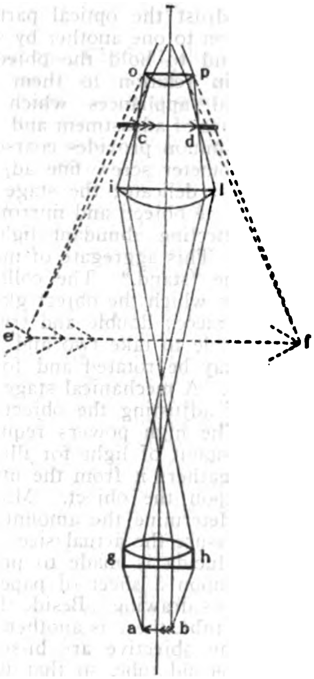

Fig. 2.

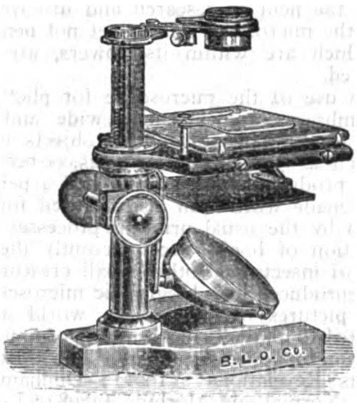

Fig. 3.— Dissecting microscope.

In the compound microscope the lens which gives the first magnified image is the one nearest the object, and therefore called object-glass or objective. The optical part which magnifies the image formed by the objective is the one to which the eye is applied and is called the eye-piece or ocular. This latter, in its usual form, is called Huyghenian, after Huyghens, who used it in the earliest and most primitive telescope construction. It consists of two plano-convex lenses, suitably mounted in brass, the lower lens being called the field lens, the upper one the eye lens. It is a negative eye-piece, as its focus lies within itself, a diaphragm, which limits the field of vision being placed at this point. The magnification of the compound microscope (Fig. 4) depends upon three conditions: (1) The power of the object-glass, (2) the power of the eye-piece, (3) the amount of separation of these two optical parts. If the focus of the object-glass is reduced, the power is increased, and the same holds true with the eye-piece. The more the objective and eye-piece are separated, the greater will be the power. It will appear from this statement, therefore, that the magnification of the microscope is unlimited, but the mere magnification of an object is less sought after and is of less value in the modern microscope than its power to disclose detail and structure. The length of tube which connects the eye-piece and objective is limited to from six to eight inches, for the sake of convenience in use. The standard length of the microscope tube must be closely adhered to or else the optical capacity (correction) of the objective will be disturbed. The power of the eye-piece rarely exceeds 15 diameters and that of the objective 150 diameters. A convex lens of one inch focus gives a magnification of about 10 diameters at a distance of 10 inches, and this holds true of a combination of lenses of this

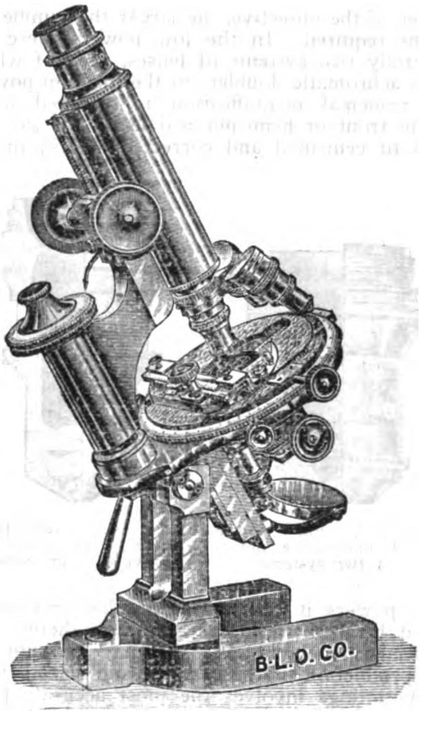

Fig. 4.— Compound microscope.

equivalent focus as in the eye-piece. If therefore a one-inch focus eye-piece is 10 inches distant from a one-inch objective, the magnifying power is 10 × 10 = 100 diameters; or, if 5 inches distant, is one half as great, or 50 diameters. The designation of power is according to the focus of a single lens having the same magnifying power as the series or combination of lenses which make up the objective as well as eye-piece. As the image of the objective is magnified by the eye-piece, it is evident that any defect in the objective is magnified to the same extent, and unless eliminated would seriously interfere with obtaining a distinct image. The main problem, therefore, remains to convey through the objective as many image-giving rays, free from defects, as possible. As a matter of fact, objectives, whatever their power, are composed of a series of lenses whose purpose it is to correct errors which would exist if single lenses alone were used, and the greater the power of the objective, the larger the number of lenses required. In the low powers there are generally two systems of lenses, each of which is an achromatic doublet; in the medium powers the principal magnification is obtained by a single front or hemispherical lens and two systems of cemented and corrected lenses; in the high powers it is usual to employ two superposed hemispherical lenses, adding thereto two corrected combinations. As may be supposed the production of these lenses and setting them in mountings involves the most accurate processes. First of all the various kinds of glass must have fixed and prescribed properties and be of absolute homogeneity and freedom from blemishes. The production of such glass is in itself a laborious and delicate process. The lenses must be accurately ground and polished to absolutely correct spherical surfaces, truly centred and cemented, then set in suitable mountings without strain at absolutely correct distance and the axes of all in alignment. The efficiency of an objective to gather up rays emanating from an object and form a perfect image is termed the angular or numerical aperture and the extent of it really determines the visibility of detail, correction for chromatic and spherical aberration being presupposed. It is only with the increase of power in objectives that it is possible to increase the numerical aperture. On account of the loss of light and inability to obtain sufficient angular aperture in the ordinary way in the very high powers, it is necessary to construct them for immersion contact with the object, and they are then termed "immersion objectives." The highest power in general use is the 1-12 inch focus, the medium powers are 1/6 to 1/8 inch and the low powers from 1 to ⅔ inch.

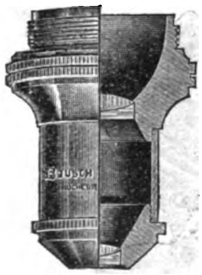

FIG. 5.— A low power (⅔") microscope objective of two systems.

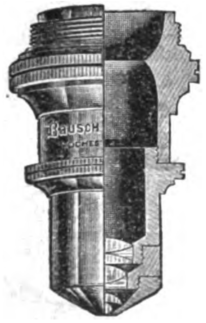

FIG. 6. — A high power (1-12") microscope objective of four systems.

To properly adjust the optical parts which have a fixed relation to one another by means of a tube (body) and to hold the object in its proper position in relation to them involves certain mechanical appliances which provide stability, convenience of adjustment and illumination: a rack and pinion provides coarse adjustment and a micrometer screw fine adjustment; both are extremely delicate; the stage or platform for placing the object, and mirror beneath the stage for reflecting abundant light and a base for stability. This aggregate of mechanical parts is called the "stand." The collar at the end of the tube to which the object glass is applied is the nose-piece; double and triple nose-pieces are also made to take two and three objectives, which may be rotated and focused on the object in turn. A mechanical stage provides delicate means of adjusting the object in place of the hands. The high powers require more than the usual amount of light for illumination and a condenser gathers it from the mirror and concentrates it upon the object. Micrometers are provided to determine the amount of magnification and measure the actual size of an object. A camera lucida is made to project the magnified image upon a sheet of paper on the table to facilitate its drawing. Beside the microscope with single tube, there is another in which the rays from the objective are bi-sected and diverted into a second tube, so that the object may be viewed with both eyes. This is the binocular microscope and with low power objectives gives a beautiful stereoscopic effect. So far as our knowledge of the action of light and the constitution of visual images goes, the best microscopes now made realize about the limit to which the seeing powers of the instrument can be brought, although experiments with especially controlled illumination, now in progress, may result in advancement in this direction. Nevertheless the field of research and discovery into which the microscope has as yet not penetrated, and which are within its powers, are almost unlimited.

The use of the microscope for photography also embraces an extremely wide and useful field. Photographs of minute objects enlarged as much as 5,000 diameters (25,000,000 areas) can be produced in this manner, and a permanent record made which can also be used for reproduction by the usual printing processes for the illustration of books, etc. Recently the movements of insects and other small creatures have been reproduced by a biographic microscope, and living pictures of the unseen world are now presented to audiences as a means of amusement.

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Microscop'ical Society, The American. See American Microscopical Society, The.

Microsco'pium, in astronomy, one of the 14 constellations which Lacaille added to the heavens in connection with his work at the Cape of Good Hope. It is a very inconspicuous constellation, its brightest star being of only 5.1 magnitude.

Microscopy, Clinical, the use of the microscope in the diagnosis of disease. The microscope, ever since its first construction, has been used in the study of disease processes, but only within comparatively recent years has it attained its present importance as an adjunct in the clinical diagnosis of many different types of disease. Owing to the development of knowledge of parasitic and infectious diseases, the physician of to-day is better able to make an accurate diagnosis by means of the microscope than were his forefathers. The microscope may be used not only to confirm a diagnosis which has been made by ordinary clinical methods, but it may abbreviate such clinical examination, or by it a diagnosis may be made without such preliminary examination. Thus at the present time consumption of the lungs may be microscopically diagnosed by an examination of the sputum, though the patient be 1,000 miles away, and in the same manner a number of diseases of allied forms may be recognized by certain minute evidences interpretable by the microscope.

The most important of the intestinal parasites that can be thus identified are the tapeworm, roundworm, hook-worm, fluke-worm, and pinworm. In all of these the physician of the present time, by a microscopical examination of the fæces, can detect the presence of the eggs of the different kinds of worms and make a definite diagnosis. It is not necessary for parents to guess at the presence of worms and to treat their children «on suspicion.» The presence or absence of worms can be accurately and definitely determined by a competent microscopist. Not only can a diagnosis of worms in general be made, but the precise kind of worm can be known by the characteristic configuration of the eggs. Examination of the fæces by the microscope can further detect various forms of indigestion and various kinds of inflammation in the intestinal tract.

As already indicated, tuberculosis can be told by an examination of the sputum, and the bacillus of tuberculosis can also be identified if it invades other organs of the body, notably the skin, bladder, kidneys, etc. The presence of tuberculosis in milk can also be demonstrated by the microscope. The influenza bacillus, the bacillus of diphtheria, the organism of cholera, of dysentery, of malignant pustule, of blood-poisoning, of pneumonia, of actinomycosis, etc., can all be identified by a microscopical examination, as also can a number of diseases due to animal parasites in the body, other than intestinal worms. Thus there is no excuse for the general diagnosis of malaria unless the exact confirmatory evidence of the malarial parasite is found in the blood. The presence of *Trichina* in the body can also be learned by the peculiar changes that take place in the blood, and the blood-parasite *Filaria* (see Filariasis), which causes a variety of conditions in the tropics, is recognizable under the microscope. Further, the microscopical examination of the blood itself offers a large field for clinical microscopy; a field which is very rapidly widening and offering increasing evidence of the value of this class of examination. There are many blood-diseases, *per se,* which can be diagnosed by simple examination. Anæmia and pernicious anæmia are important examples. Moreover, most of the acute infectious diseases cause certain changes in the blood which may be utilized in microscopical work for diagnostic purposes. The Widal agglutination reaction (q.v.) in typhoid fever is an important development in this line. Other agglutinating reactions are of immense importance in medico-legal work. These blood-changes are of a very definite character, and have been studied by physicians the world over. Because of their peculiar technical nature they lend themselves to charlatan misinterpretation and serve as a basis for many quackish advertisers.

Microscopical examination of the urine has long been practised. By it various forms of disorder of the bladder and of the kidney can be told, and both renal disease and bladder-disease can be detected long before such troubles become chronic and dangerous. In much the same manner the microscope can be used to examine other secretions and excretions of the human body — the secretions from the nose, the vomit, the exudates in pleurisy, exudates in meningitis and peritonitis, etc.— and in the study of drinking-water, milk, and foodstuffs. In fact there is no branch of medicine in which definite and far-reaching results have not been obtained by means of the microscope. Consult: von Jaksch, 'Clinical Diagnosis'; Simon, 'Clinical Diagnosis'; Ewing, 'Pathology of the Blood'; and Cabot, 'The Blood.'

Microtasim'eter, an instrument invented by Thomas A. Edison in 1878. He uses the principle of the carbon microphone to measure infinitesimal pressure, or for detecting very slight pressure.

Mi'crotome, an instrument for cutting thin sections of portions of plants and animals preliminary to their microscopic examination. The objects to be cut are imbedded in some material such as paraffin or celloidin, or frozen in gum, which makes the slicing of minute or delicate objects readily feasible. The cutting used to be done by holding the prepared object in one hand and wielding a razor in the other, but this method, apt to yield sections of unequal or insufficient thinness, has given place to the use of some device by which a sliding razor slices a fixed but adjustable object, or by which the object is made to move up and down across the edge of a razor. Many forms are on the market.

Midas, mī'das, in Greek myth, a king of Phrygia, proverbial for his golden touch and for his ass's ears. The gift of the golden touch came from Bacchus, whose follower, Silenus, Midas rescued and treated kindly; in return Bacchus offered him any wish he would name and Midas asked that all that he touched should be turned into gold. When he found that food and drink became gold at the touch of his lips, Midas besought Bacchus to take back the gift; some stories say he was sent to bathe in the river Pactolus, which ever after was full of gold-bearing sand. His ass's ears were given Midas by Apollo to punish the king for declaring Pan's pipe more musical than Apollo's lyre. Hence "ears of Midas" is a phrase used of ignorant critics. Midas' barber discovered the king's secret deformity; and whispered it into a hole in the ground, when grew up reeds whispering the story in the wind.

Midas Monkey, a marmoset (q.v.).

Middelburg, mĭd'dĕl-boorg, Netherlands, capital of the province of Zealand, on the island of Walcheren, 4½ miles northeast of Flushing. Middelburg was a mediæval Hanse town, and one of the leading mercantile cities of the United Provinces, sending many ships to the East and West Indies, and the Levant. Its former commercial importance, however, has declined, being now confined chiefly to a coasting and domestic trade.

Middle Ages, The, a period of history supposed to extend from the fall of the Roman Empire to about the year 1550, covering from 10 to 11 centuries. The Middle Ages embrace that period of history in which the feudal system was established and developed, down to the most prominent events which necessarily led to its overthrow, though its consequences and influences are still very observable in the states of Europe. The first centuries of the Middle Ages are often termed the Dark Ages (q.v.), a name which they certainly deserve. Still, the destruction of Roman institutions by the irruption of barbarous tribes is often unduly lamented, and the beneficial consequences attending it overlooked. True it is that many of the acquisitions which had cost mankind ages of toil and labor were lost in the general wreck, and only regained by the efforts of many successive generations; the flowers of civilization were trampled under foot by barbarous warriors; the civil development of society suffered a most severe shock; those nations to which Roman civilization had extended previous to the great invasion of the Teutonic tribes were thrown back in a great measure to their primeval barbarism, and the unruly passion for individual independence greatly retarded the development of public and private law, and in some countries has entirely prevented a regular civil constitution. So also the most remarkable institution of that time, its characteristic production — chivalry — exhibited all the peculiarities of the corporations. War was the profession of the nobles. No one of their order who was not a knight could bear a lance or command cavalry. The weak side of the Middle Ages is the scientific. Physical science was still in a very crude state, and the lack of the proper apparatus necessary for its accurate pursuit was a serious handicap. Considering, however, the inefficient means then at hand, the knowledge attained, though of course rude, inaccurate and often mere guessing, was greater than is popularly supposed. The efforts of Charlemagne in the 8th century to encourage science and instruct the people laid the foundations for a more thorough and systematic training, which culminated in the great schools of Scholasticism of the 12th and 13th centuries. The process was slow and often retarded by the unsettled social and political conditions that prevailed through this period. The 14th and 15th centuries witnessed a rapid and brilliant development finding its apogee in the renaissance movement. See HISTORY.

Middle English. See ENGLISH LITERATURE.

Middle Kingdom, The (Chinese, Tchang-kooe), a name applied to the Chinese empire by the natives, who imagine that it is located in the middle of the earth.

Middleboro, mĭd'l-bŭr-ō, Mass., town in Plymouth County; on the Nemasket River, and on branches of the New York, N. H. & H. railroad; about 30 miles south of Boston and 18 miles northeast of Fall River. It is one of the oldest towns in the county, having been incorporated 1 June 1669. It includes the villages of Nemasket, North Middleboro, South Middleboro, Four Corners, Puddingshire, Waterville, Tack Factory, Eddyville, Rock, the Green, and Thomastown. It has excellent water-power, obtained from three falls. The chief manufactures are woolen goods, shoes, stove polish, lumber, dressed marble, grates, foundry and machine-shop products. It has several well-built churches, good schools, and a public library. It is a favorite summer resort, on account of its attractive scenery and the temperature being modified by the sea breezes. Pop. (1900) 6,885; (1910) 8,214. Consult Barber, 'Historical Collections of Massachusetts.'

Middleburg, mĭd'l-berg, **Aldie and Upperville, Cavalry Engagements at.** On 16 June 1863 Gen. Stuart, with three brigades of his cavalry division, moved north from the Rappahannock to screen the movement of the Confederate army toward the Potomac. Stuart's orders were to keep along the eastern base of the Blue Ridge, occupy the passes of Bull Run Mountain, and cover the front of Longstreet's corps. On the 17th Fitzhugh Lee's brigade, under Col. Munford, was sent from Piedmont, by way of Middleburg, to Aldie, to hold the gap in the mountain as a screen to Longstreet's movements, while W. H. F. Lee's brigade reconnoitred toward Thoroughfare Gap. Robertson's brigade was posted at Rectortown. Stuart, with his staff and a few pickets, made his headquarters at Middleburg. Gen. Pleasonton was near Manassas Junction and scouting in the direction of Bull Run Mountain, and at 2:30 P.M. of the 17th Kilpatrick's brigade of cavalry ran into Munford's pickets, driving them back to Aldie, where, west of the village, he found Munford strongly posted on a hill covering the road to Snicker's Gap. A severe engagement ensued, lasting until dark, when Munford withdrew toward Middleburg, under orders from Stuart, who had been attacked. The Union loss was 50 killed, 131 wounded, and 124 missing. Munford's loss was 119 killed, wounded, and missing. While Kilpatrick was engaged at Aldie Col. Duffié, with the First Rhode Island cavalry 300 strong, having passed through Hopewell Gap, reached Middleburg about 4 P.M., drove in Stuart's pickets, and occupied the town, Stuart narrowly escaping to Rector's Cross Roads, and sending orders for Munford to withdraw from Aldie, the other two brigades to move upon Middleburg, and all to concentrate against Duffié. Robertson's brigade arrived at 7 P.M. and attacked Duffié, who made a good fight behind stone walls and barricades, repelling several assaults, but was finally driven from town, with severe loss, and compelled to retreat by the road upon which he had come until he had crossed Little River, where he halted, and where during the night he was entirely surrounded by

W. H. F. Lee's brigade. Duffié endeavored to cut his way out, but was met by heavy fire, and a great part of his command captured, Duffié escaping with a few men and making his way back to Hopewell Gap and Centreville. His total loss, killed, wounded, and prisoners, was over 200. On the 18th Stuart took position outside of Middleburg with Robertson's brigade. Munford was on the left at Union and Jones' brigade was ordered up as a reserve. Pleasonton moved forward with all his available force, and occupied Middleburg and Philemont on the road to Snicker's Gap. On the 19th Gregg, with two brigades of his own division and one of Buford's, advanced and steadily drove Stuart in the direction of Upperville, losing 99 in killed, wounded, and missing. During the day Hooker advanced and occupied Aldie Gap with infantry. On the 20th Stuart concentrated his five brigades about three miles west of Middleburg, Pleasonton remaining at Middleburg. On the morning of the 21st Pleasanton moved out of Middleburg, Buford's division by the road through Union, to turn Stuart's left, Gregg's division, supported by Vincent's infantry brigade on the main road to Upperville. Buford encountered W. H. F. Lee's and Jones' brigades and drove them back, and Gregg met Hampton's and Robertson's brigades, driving them steadily to Goose Creek, where they remained several hours, when they again fell back to effect a junction at Upperville with Jones and W. H. F. Lee, who were falling back before Buford. As Pleasonton neared Upperville the fight increased in severity, and Stuart was driven through the town to Ashby's Gap. The Union loss during the day was 12 killed, 130 wounded, and 67 missing. On the 22d Pleasonton fell back to Middleburg and Aldie. The Union loss June 17–21 was 883 killed, wounded, and missing; the Confederate loss was 65 killed, 279 wounded, and 166 missing, an aggregate of 510. Consult: 'Official Records,' Vol. XXVII.; Doubleday, 'Chancellorsville and Gettysburg'; McClellan, 'Life of Maj.-Gen. J. E. B. Stuart.'

E. A. Carman.

Middlebury, mĭd'l-bĕr-ĭ, Vt., village, county-seat of Addison County; on the Otter Creek, and on the Rutland railroad; about 40 miles in direct line southwest of Montpelier, the capital of the State, and 35 miles south of Burlington. It is on the eastern slope of the Green Mountains, near the foot-hills. It is in an agricultural and stock-raising region, with large marble quarries in the vicinity. It was settled in 1773, but was abandoned during the Revolutionary War, because it was on the route traversed by many of the British and Indian soldiers, and the lives of the people were constantly in danger. It was incorporated as a borough in 1813 and as a village in 1832. The chief manufactures are lumber and lumber products, foundry products, flour, lime, dressed marble, and dairy products. The village is the seat of Middlebury College (q.v.), and has two libraries, and the Sheldon Art Museum. Some of the principal buildings, besides the college, libraries, and museum, are the opera house, court-house, several churches, and the public and parish schools. The water-power is most valuable, and sufficient for more manufacturing establishments. The government is vested in a board of trustees elected annually; the subordinate officials are chosen by the trustees. Pop. (1900) 1,897; (1910) 2,848. Consult Swift, 'History of the town of Middlebury.'

Middlebury College, in Middlebury, Vt., has a charter which bears the date 1 Nov. 1800. The first meeting of the corporation was held 4 Nov. 1800, when Jeremiah Atwater was made president, and Joel Doolittle, tutor, both graduates of Yale. The college opened 5 Nov. 1800, with seven students. The building used was a part of a large wooden structure erected for the Addison County Grammar School. For a number of years the school was sustained mainly by the generous contributions of the people of Middlebury. In 1810 Col. Seth Storrs, one of the trustees, gave to the college 30 acres of land which is now a part of the campus. In 1815 Painter Hall was built on this land, a building named after Gamaliel Painter, a generous benefactor. The same year the State legislature passed a vote complimenting the new college on its success, but gave no pecuniary assistance. Later bequests came; 5,000 acres of wild land and $14,000. To these gifts donations were added, but the college had a struggle for existence and the brunt was bravely borne by the loyal faculty and the generous people of Middlebury. The Civil War took away a number of the best and bravest, as it depleted the colleges all over the country. Statistics show that up to and including 1902, there have been 1,567 graduates. Of this number 538 became clergymen; 100 professors in colleges and seminaries; 366 lawyers, including 50 judges; and 93 physicians. Nine of the graduates have been governors of States and Territories. From 1883 to 1902 the college has been coeducational; in 1902 the legislature of the State granted a charter authorizing the establishment of a separate college for women.

The courses lead to the degrees of B.A. and B.S. Various prizes and the incomes of 120 scholarships are available for assisting worthy students. The library contains nearly 30,000 volumes; the new marble library building is a gift from Egbert Starr and Dr. M. Allen Starr. Other buildings, all of stone, are the Warner Science Hall, the chapel, the Painter Hall, Battel Hall (women's building), and the dormitories for young men. In 1910 there were connected with the school 20 professors and instructors and 275 students. The productive fund was $484,200 and the income nearly $55,000.

Mid'dlemarch, a novel by George Eliot, published in 1872. This the author is said to have regarded as her greatest work. It takes its name from a provincial town in or near which its leading characters live. The book is really made up of two stories, one centring around the Vincy family, and the other around Dorothea Brooke and her relatives. In the characters of Dorothea and Lydgate George Eliot develops the main purpose of this novel, which is less distinctly ethical than some of her others.

Middlesbrough, mĭd'lz-brō (not Middlesborough), England, a river port, municipal county, and market town, in the North Riding of Yorkshire, near the mouth of the Tees, 44 miles north of York. Middlesbrough dates from about 1830, and the development of the coal and iron mines of the neighboring Cleveland Hills and Durham fields. It is distinguished for its municipal enterprise; has wide and regular streets, handsome public buildings; and extensive and commodious docks. Its chief industries are connected with iron manufactures, producing annually over 2,000,000 tons of pig-iron; in 1901 it exported 960,785 tons of pig-iron, and 353,649 tons of manufactured iron and steel. It has numerous blast-furnaces and rolling-mills, foundries, engineering works, ship-yards, etc.; and salt is extensively worked, there being a thick bed of rock salt at a depth of 1,300 feet. The borough was incorporated in 1853 and received a county charter in 1888.

Middlesex (mĭd'l-sĕks) **Fells,** Boston, Mass., a picturesque hill, wood, and lake reservation of the metropolitan park system of “Greater Boston,” enclosing Mystic Lakes; area from 3,000 to 3,200 acres. The Fells are part of the suburban townships of Malden, Melrose, and Stoneham north of Boston.

Middleton, mĭd'l-tŏn, **Arthur,** American colonist: b. South Carolina 1681; d 1737. He was conspicuously engaged in public affairs as a member of the council as early as 1712; and exerted his political influence in favor of popular claims, opposing the lords proprietors, and finally heading the revolution which threw off the whole proprietary government and placed the colony under the immediate protection of the crown (1719). In 1725 he succeeded Nicholson as acting governor of the colony, which office he held till 1731, when the royal governor arrived; he then retained his position in the governor's council. His administration as governor was partly occupied by war and negotiations with the Spaniards of Florida and the French of Louisiana.

Middleton, Arthur, American patriot, signer of the Declaration of Independence, grandson of the preceding: b. Middleton Place, Ashley River, S. C., 26 June 1742; d. Goose Creek, S. C., 1 Jan. 1787. He was educated in England at the University of Cambridge, then returned to South Carolina for a time, and was a member of the legislature, but went abroad again for two years' travel on the Continent. On his final return to America, he established himself as a planter, and soon became one of the leaders of the Revolutionary party. He was one of the most efficient members of the first council of safety, and in 1775 was sent to the Provincial Congress. In 1776 he was sent as a delegate of the State to the Continental Congress, and as such affixed his signature to the Declaration of Independence. He held his seat in Congress until 1777, declined the governorship of South Carolina in 1778, and took the field for the defense of Charleston in 1779. His plantation was devastated by the British and he was made a prisoner after the fall of Charleston in 1780, and was one of the leading citizens who were kept in confinement as hostages. His estate was sequestered, and he was shipped to the castle of Saint Augustine, and thence transferred to the Jersey prison ship. Exchanged in the latter part of 1780, he served till the close of the war as a delegate in the Continental Congress, and was afterward elected to the State senate. He was a skilful stenographer, and reported many of the debates in which he participated. He also wrote effective political essays under the signature of “Andrew Marvell.”

Middleton, Conyers, English clergyman: b. York (or Richmond) 27 Dec. 1683; d. Hildersham, Cambridgeshire, 28 July 1750. He was graduated from Trinity College, Cambridge, in 1703; became fellow of the college in 1706; was one of the 30 fellows who petitioned against Bentley, then master of Trinity, in 1710; was involved in a dispute with Bentley as to a fee paid by him to Bentley upon his receiving the D.D. (1717); and was sued for libel by Bentley for statements made in his ‘Present State of Trinity College’ (1719). The feud was adjusted by a compromise. In 1731–4 he was Woodwardian professor of mineralogy. For his part in a controversy with Waterland regarding the historical accuracy of the Bible, he was threatened with the loss of his degrees. His best-known work is the eulogistic ‘Life of Cicero’ (1741), once highly esteemed for its style, but in part plagiarized from Bellenden's ‘De Tribus Luminibus Romanorum.’ His treatises on “the Miraculous Powers which are supposed to have subsisted in the Christian Church from the earliest ages” (1748–9) aroused much comment.

Middleton, Sir **Frederick Dobson,** British soldier: b. Belfast, Ireland, 4 Nov. 1825; d. England 1898. He was graduated from the Royal Military College at Sandhurst in 1842, and entering the army served in many campaigns in the colonies and received the Victoria cross for gallant conduct in India. In 1884 he was placed in command of the Canadian militia and crushed the Riel rebellion, in recognition of which service he was knighted. He returned to England in 1890.

Middleton, Henry, American politician and diplomat: b. Middleton Place, S. C., 1771; d. Charleston, S. C., 14 June 1846. He was elected to the State legislature in 1801, serving till 1810. He was soon recognized as a leader, and in 1810–12 was governor of the State. He supported the war policy in 1812, and in 1815 he was elected to Congress, where he served four years. In 1820 he was appointed minister to Russia, in which capacity he negotiated a treaty regulating trade and fisheries in the Pacific (1824). He returned to the United States in 1830, and retired from public life.

Middleton, Thomas, English dramatist: b. probably in London about 1570; d. Newington Butts July 1627. Little is known of his life, but his writings testify to the excellence of his education before his entry at Gray's Inn in 1593 (or 1596). Several minor prose works preceded what seems to be his first play, ‘Old Law,’ written with Rowley in 1599. From that time on he wrote constantly for the stage, now alone, now with Rowley, Massinger, or Dekker. Among these works are several masques, of which the best and most dramatic is ‘The World Lost at Tennis.’ Middleton's ‘Witch’ is his best known work because of the claim, often made since its publication in 1778, that it must have furnished hints for the song of the witches in Shakespeare's ‘Macbeth’; but Middleton's verse, which is particularly reminiscent of ‘Romeo and Juliet,’ and his imitation of Shakespeare, as, for example, of ‘Hamlet’ and ‘Tempest,’ possibly of ‘Pericles,’ too, in ‘The Mayor of Quinborough,’ make such a view untenable. It is more likely that the songs were taken from Middleton's play and inserted into the acting edition of ‘Macbeth.’ The most successful play by Middleton was ‘A

Game of Chess,’ which satirized the wooing of the Spanish Infanta and was stopped by privy council; it packed the playhouses because of its political and Protestant tone. Among his other plays are ‘Michaelmas Term’ (1607), a story of city intrigue; ‘A Trick to Catch the Old One’ (1608), his best comedy of intrigue; ‘The Roaring Girl’; ‘The Spanish Gipsy,’ which, like the ‘Mayor of Quinborough’ and ‘A Mad World,’ has the Hamlet-like trick of a play within a play; and ‘Women Beware Women,’ his best single play. As a rule Middleton is erratic and ill-sustained, and his characters low and coarse, but sometimes wonderfully analyzed. Consult the editions by Dyce (1840) and Bullen (1886), and Swinburne's essay in the ‘Nineteenth Century’ for January 1866. Middleton's best plays appear in a volume of the ‘Mermaid Series’ (1887).

Middleton, Thomas Fanshawe, English prelate and classical scholar: b. Kedleston, Derbyshire, 26 Jan. 1769; d. Calcutta 8 July 1822. He was educated at Christ's Hospital, London, and Pembroke Hall, Cambridge; took orders in the Anglican Church, and in 1814 was consecrated first bishop of Calcutta. He wrote ‘The Doctrine of the Greek Article applied to the Criticism and Illustrations of the New Testament’ (1808, 5th ed. 1858). Consult ‘Life’ by Le Bas (1831).

Middleton, Canada, a town of Annapolis County, Nova Scotia, 102 miles northwest of Halifax. Its industries are connected with the valuable iron and copper mines in the neighborhood, and it has railroad interests as a station on the Windsor & Annapolis railroad, and as the northwest terminus of the Nova Scotia Central railroad.

Middleton, England, a market town, municipal and parliamentary borough, in Lancashire, 5 miles northeast of Manchester. Its industrial establishments include cotton and silk factories, dye and print works, ironworks, chemical works, etc., and coal is mined in the vicinity. The grammar school was founded in 1572, and there are four free libraries and reading rooms, parks, recreation grounds, and a handsome market-place.

Middletown, mĭd'l-town, Conn., city, county-seat of Middlesex County; on the Connecticut River, and on the New York, New Haven & Hartford railroad; about 18 miles south of Hartford. It is opposite Portland, where are valuable brownstone quarries. The places are connected by a long drawbridge.

The city was founded in 1650 and the next year was incorporated as a town under the name of Mattabeseck. Two years later the name was changed to Middletown. It was granted a city charter in 1784. For a number of years there was considerable trade with the West Indies, and until 1886 Middletown was the port of entry. In that year the custom-house business was removed to Hartford.

Middletown is in an agricultural region in which tobacco is one of the principal products. The good water-power here has aided in making the place a manufacturing city. The chief manufactures are pumps, bone goods, cotton webbing, hammocks, rubber goods, silks, harness trimmings, locks, marine hardware, and silver-plated ware. The educational institutions are the public and parish schools, the Wesleyan University (q.v.), the Berkeley Divinity School (P. E.), opened in 1854, and the Russell Free Library which contains about 15,000 volumes. It has the State Hospital for the Insane, and the State Industrial School for girls.

The charter of 1882, under which the government is administered provides for a mayor, who holds office two years, and a city council. The subordinate officials are chosen by the mayor and council. Pop. (1900) 9,859; (1910) 20,749.

Consult: Whittemore, ‘History of Middlesex County, Conn.’

Middletown, Del., town, in Newcastle County; on the Philadelphia, Wilmington & Baltimore railroad; about 22 miles south by west of Wilmington, the capital of the State. It is in an agricultural region in which the chief productions are fruits. The principal manufactures are canned-fruits, wagons, and agricultural implements. The population is estimated at 2,000.

Middletown, N. Y., city, in Orange County; on the New York, Ontario & W., the New York, Susquehanna & W., and the Erie R.R.'s; nearly midway between the Hudson and Delaware rivers, and about 66 miles northwest of the city of New York. Middletown was settled about the middle of the 18th century; its location on the Minisink road, the route to the “West,” and half-way between the important rivers of this section, gave the place its name, and its early importance. At first it was included in the Walkill township. In 1848 it was incorporated as a village, and 27 June 1889 was chartered as a city. It is in a fertile agricultural region, and has a large trade in dairy products, live-stock, and garden produce. It has the New York, Ontario & Western railroad shops, and the chief manufactures are hats, shirts, saws, printers' supplies, files, carpet-bags, leather, condensed-milk, paper boxes, and cigars. Some of the noted public institutions are the State Homœopathic Hospital for insane, with 1,300 patients (1903), the churches, and the schools. There are seven churches, seven public schools (ward schools), one parish school, an excellent high school, Saint Joseph's Academy (R. C.), and the Thrall Public Library. There are two national and one savings bank, which with one trust company bank have a combined capital of $400,000.

The government is administered under a charter of 1902 which provides for a mayor, who holds office two years, and a common council of nine members, each one of whom holds office two years. The mayor appoints, subject to the approval of the council, the members of the board of health, and the council elects the engineer, city clerk, and corporation counsel. There are but few foreign born inhabitants, chiefly Italians. About 100 are colored persons. Pop. (1910) 15,313.

John W. Slauson,
Editor of ‘Press.’

Middletown, Ohio, city, Butler County; on the Miami River, the Miami and Erie Canal, and on the Cincinnati, H. & D., the Cincinnati Northern, and the Cleveland, C., C. & St. L. R.R.'s; about 34 miles north of Cincinnati. It was settled about 1794. It is in an agricultural section, but the good water-power has contributed toward making it a manufacturing city. Its principal manufactures are bicycles, agricultural instruments, tobacco products, paper, flour, and dairy products. It has an opera house, a Masonic Temple, public and parish schools, and several fine churches. The city owns and operates the waterworks. Pop. (1890) 7,681; (1900) 9,215; (1910) 13,152.

Middletown, Pa., borough, in Dauphin County; on the Susquehanna River, and on the Philadelphia & Reading and the Pennsylvania R.R.'s; about 10 miles southeast of Harrisburg. It was founded in 1756, and in 1828 was incorporated. It is in a farming region, but it has considerable manufacturing interests. The principal manufactures are flour, dressed lumber, leather, foundry products, tubing, stoves, furniture, and cars. Stone quarries in the vicinity contribute to the industrial wealth of the borough. Its trade is in the manufactured articles, farm and dairy products. The borough owns and operates the electric light plant. Pop. (1890) 5,080; (1900) 5,608; (1910) 5,374.

Midgard, mĭd'gärd, in Scandinavian mythology, the dwelling place of the human race, formed out of the eyebrows of Ymir, one of the first giants, and joined to Asgard, the abode of the gods, by the rainbow-bridge.

Midge. See BLACK-FLY; GNAT.

Midhat Pasha, mĭd'hät păsh'â, Turkish statesman: b. Constantinople 1822; d. Arabia May 1884. He entered the Turkish government service, was made pasha in 1820, was governor successively of Uskup, Bulgaria, and Salonica, and distinguished himself by his wise administration. In 1873 he was for a short time grand-vizier. He aided in deposing the Sultans Abd-ul Aziz and Murad V. in 1876, was grand-vizier under Abd-ul Hamid (Dec. 1876–Feb. 1877), and was then banished by the suspicious monarch. Later, however, he was governor of Smyrna, then of Syria. He was tried with other pashas for the murder of Abd-ul Aziz, was found guilty, and was sentenced to death; but this sentence was commuted to life imprisonment. He wrote 'La Turquie: Son Passé et son Avenir' (1878).

Midianites, mĭd'ĭ-ạn-ītz, an Arab tribe, descended, according to Scripture, from Midian, the son of Abraham by Keturah. They occupied most of the country between the Arabian Gulf and the Plains of Moab. The Midianites were very troublesome neighbors to the Israelites till Gideon's victory over them. Midian ceased to be Egyptian and became Turkish in 1887. Consult 'Midian Revisited' (1879).

Mid'land, Mich., city, county-seat of Midland County; on the Chippewa and Tittabawassee rivers, and on the Michigan Central and the Pere Marquette R.R.'s; about 20 miles west of Bay City. It is in what was once a lumbering region, and its industries are still connected with the products of the forests although in the near vicinity the woods have about all been turned into lumber. Its principal manufactures are shingles, lumber, tubs, hoops, pails, bromine, and salt. Pop. (1910) 2,527.

Midnapur, mĭd-nạ-poor', India, a town and administrative district of Bengal. The town is the capital of the district and is 68 miles by rail west of Calcutta. It is the centre of an important indigo and silk industry, and has manufactures of brass and copper goods. Pop. (1901) 33,140. The district forms the southern part of the Bardwán division, bounded on the east by the river Hugli. It has an area of 5,186 square miles.

Midnight Judges, or **Appointments,** a term applied to executive appointments or nominations made by President John Adams, the last night of his administration. Congress had passed a bill authorizing the appointment of 18 new United States judges, and Adams with the consent of the Senate appointed judges to fill these newly created vacancies. They were known as «Adams' Midnight Judges.» The new law was repealed early in Jefferson's term and the judges lost their offices.

Mid'rash (Hebrew, from *darash,* to make research), among the Jews, is the general name given to the exposition or exegesis of the Scriptures. When such writings first arose is not known, but the most flourishing period of midrashic exegesis was from about 100 B.C. to 200 A.D. The term midrash expressed «any and every ancient exposition on the law, psalms, and prophets, disquisitions that took the form of allegorical illustration, homiletics, or practical commentary.» Thus in its most general meaning it expressed the whole uncanonical Jewish literature, including the Talmud, down to the compilation of the book Jalkuth in the 13th century, since which time the term gradually ceased to be applied to rabbinical writings. See HEBREW LITERATURE; TALMUD.

Mid'riff (A.-S. *mid,* middle; *hrif,* abdomen), the diaphragm (q.v.).

Mid'shipman, in the American and British navy, a young officer who has previously held the position of a naval cadet. The cadets require to be nominated before they can come forward for competition. After two years' training on board a training-ship, the cadet is expected to pass the examinations appointed. If he gain a first-class certificate he becomes a midshipman at once, otherwise he has to serve for six to twelve months at sea. A midshipman after four years and a half may become a sublieutenant; he then studies at the Naval College, is trained in gunnery and torpedo practice, takes a course in pilotage, and then may become a lieutenant.

Midshipman, a Californian coast-fish of the genus *Porichthys.* See CABEZON.

Midshipman Easy, Mr., a nautical romance by Captain Frederick Marryat, published in 1836. It narrates the adventures of a spoiled lad, the son of a so-called philosopher, who cruises about the world, falls in love, has misfortunes and at last good luck and a happy life. The incidents themselves are nothing, but the book is entertaining for its «character» talk, and because the author has the gift of spinning a yarn.

Midsummer Eve. See SAINT JOHN'S, EVE OF.

Midsummer Night's Dream, A, a comedy by Shakespeare, written about 1598. It is spoken of by Meres in his 'Palladis Tamia' (1598) and was entered on the Stationers' Register 8 Oct. 1600. The theme of this joyous comedy is love and marriage. Duke Theseus is about to wed the fair Hippolyta. Lysander is in love with Hermia, and so is Demetrius; though in the end, Demetrius, by the aid of Oberon, is led back to his first love Helena. The scene lies chiefly in the enchanted wood near the duke's palace in Athens. In this wood Lysander and Hermia, and Demetrius and Helena, wander all night and meet with strange adventures at the hands of Puck and the tiny fairies of Queen Titania's train. An overture ‘Midsummer Night's Dream’ was composed by Mendelssohn in 1826, and his music for the drama was written in 1843.

Mid'way Islands, North Pacific Ocean, so named from being midway between Asia and America, are the northernmost islets of the Hawaiian group, extending about 1,800 miles north by west of Honolulu. The islands have come into prominence as the intermediate station of the American-Pacific cable to the Ladrone and Philippine Islands via Honolulu. The group consists of a low coral atoll 18 miles in circumference, enclosing Sand Island, Eastern Island, and two islets. Sand Island, the largest, is 1¾ miles long, ¾ of a mile wide, and has an average elevation of from three to ten feet above sea-level, the highest point attaining 43 feet. Eastern Island is 1¼ miles long, one half mile wide, and from six to twelve feet high. Both islands are partly covered with coarse grass and bushes, the breeding ground of the tern or sea-swallow. Good water is obtained by sinking wells, while fish of many varieties, turtles, crabs and crawfish, etc., abound in the lagoon; sea-birds also are easily caught. The islands are inhabited only by the employees at the cable stations. From 1887–9 a shipwrecked crew lived here for 14 months until rescued, losing, however, several of their number from scurvy. A short distance west of the islands a submarine mountain rises 2,200 feet from the ocean bed to within 82 fathoms of the surface, and between the islands and Guam is an abyss of over 4,900 fathoms, one of the deepest in the world.

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Midwife Frog. See OBSTETRICAL FROG.

Mid'wifery. See OBSTETRICS.

Mielziner, mĕl'zĭn-ėr, **Moses,** American rabbi and educator: b. Schubin, Germany, 12 Aug. 1828; d. Cincinnati, Ohio, 18 Feb. 1903. After studying at the University of Berlin, he became rabbi of a congregation in Waren, Germany, and then head of a theological school in Copenhagen. In 1865 he was called to the rabbinate of a New York synagogue, which he held until 1873, when for six years he was principal of a private school besides co-operating in the Emanu El Preparatory School. In 1879 his real educational work was begun in the United States when he was appointed professor of the Talmud at the Hebrew College, which position he held until his death. As teacher he was clear, exact and thorough. His published works include: ‘The Jewish Law of Marriage and Divorce’ (1884); ‘Selections from the Book of Psalms’ (1884); ‘Slavery among the Ancient Hebrews’ (1894); ‘Introduction to the Talmud’ (1884 and 1903); ‘Legal Maxims and Fundamental Laws of the Civil and Criminal Code of the Talmud’ (1898); ‘Rabbinical Law of Hereditary Success’ (1900).

Mieris, mĕ'rĭs, **Frans van,** “the Elder,” Dutch painter: b. Leyden 12 April 1635; d. there 12 March 1681. He was originally a pupil of the glass painters A. Torenvliet and G. Dous and eventually became so famous as a canvas artist that the grand-duke of Tuscany, and other noblemen ordered pictures from him; his work was remarkable both for refinement of handling and elegance of design. His portraits and genre pictures, in which both nobility and bourgeoisie are represented, are not conspicuous for striking and original characterization. Only two or three figures appear in most of his genres, and his compositions of this kind are delicate and smooth to a degree that renders them almost inanimate. There are portraits of himself and his wife in the gallery of The Hague, and in the Pinakothek at Munich, which latter collection is especially rich in examples of this master, among them ‘An Oyster Breakfast’; ‘Lady Playing a Lute’; ‘The Trumpeter’; ‘The Sick Woman.’ Many of his pictures are to be met with in the galleries of Paris and Dresden such as ‘The Artist’; ‘A Lady Painting’; ‘Love's Message’; ‘The Music Lesson’; and in the Berlin Gallery is his ‘Young Lady before a Looking-glass.’

Mieris, Frans van, “the Younger,” grandson of the preceding, Dutch painter: b. Leyden 24 Dec. 1689; d. there 22 Oct. 1763. He painted genre and portraits after the manner of his father, who had produced a number of small club pictures, and of his grandfather. He did more service perhaps by his literary work than by his pictures, which have the ancestral fault of superficiality. He wrote ‘Histoire der Nederlandsche Vorsten’ (1732–5); ‘Groot Charterbook der Graven van Holland, van Zeeland en Herren van Vriesland’ (1753–6); and ‘Handvesten der Stad Leyden’ (1759).

Mieroslawski, mē-ā-rō-slăw'skē, **Louis,** Polish general: b. Nemours, France, 1814; d. Paris 13 Nov. 1878. He joined the Polish revolution of 1830; fought with conspicuous zeal; upon the suppression of the movement returned to France; in 1840 was a member of the central committee of the Polish emigration party; and later was identified with the unsuccessful conspiracies of 1846, 1848–9, and 1863. He wrote a ‘History of the Polish Revolution’ (1837) in French, and political and historical works in Polish.

Mifflin, mĭf'lĭn, **Lloyd,** American poet: b. Columbia, Pa., 15 Sept. 1846. He was educated at Washington Classical Institute and abroad and devoted himself to painting, a collection of which he has exhibited. His health failed and he devoted himself to literature and is the author of: ‘The Hills’ (1896); ‘At the Gates of Song’ (1897); ‘The Slopes of Helicon and Other Poems’ (1898); ‘Echoes of Greek Idyls’ (1899); ‘The Fields of Dawn and Later Sonnets’ (1900).

Mifflin, Thomas, American soldier and politician: b. Philadelphia 1744; d. Lancaster, Pa., 20 Jan. 1800. He was by birth a Quaker; was graduated at Philadelphia College in 1760; entered public life in 1772 as a member of the Pennsylvania Assembly; and in 1774 was elected a delegate to the Continental Congress. In 1775 he entered the army with the rank of major, and as colonel and first aide-de-camp to Washington accompanied him to Cambridge. He subsequently held the appointment of adjutant-general, and in the spring of 1776 was commissioned as brigadier-general. He fought in the battle of Long Island, and by his energy succeeded in the latter part of 1776 in raising considerable reinforcements in Pennsylvania to recruit Washington's army. He was present at the battle of Trenton, and did good service in driving back the enemy's line of cantonments from the Delaware. In 1777 he was made a major-general, and in the same year became an active member of the faction organized for the purpose of placing Gates at the head of the Continental army, and known in history as the Conway Cabal (q.v.). The project failing, he resigned his commission, and in 1782 was elected to Congress, of which body he became president during the following year. In this capacity he received from Washington the resignation of his commission as commander-in-chief. In 1785 he became speaker of the Pennsylvania legislature, and in 1787 he was a delegate to the Constitutional convention. In October 1788, he succeeded Franklin as president of the Supreme Executive Council of Pennsylvania, which position he filled for two years; and from 1790 to 1799 he was governor of the State. In 1794, while holding this office, he rendered important assistance to Washington in quelling the Whiskey Insurrection (q.v.).

Mifflin, Warner, American reformer: b. Accomac County, Va., 21 Oct. 1745; d. near Camden, Del., 16 Oct. 1798. When a boy on his father's plantation he became convinced of the evil of slavery, and when he himself became a slave owner, he freed all his slaves and paid them for their past services. He was a Quaker, and traveled widely, preaching against slavery. It was largely through his efforts that the Quakers came to oppose slavery, and many followed his example in freeing their slaves. On account of his religious principles he opposed the Revolutionary War, and at the time of the battle of Germantown, interviewed both General Washington and General Howe to impress upon them the evils of the war. In 1782 he was instrumental in securing a law in Virginia which allowed for emancipation of slaves; in 1783 he presented a memorial to Congress in regard to slavery, and in 1791 another memorial on the same subject to the President and Congress, which was the cause of a sharp debate on the right of petition. Shortly afterward he published a series of essays defending his position in the matter.

Mifflin, Fort. See FORT MIFFLIN.

Mignard, Pierre, French painter and engraver: b. Troyes November 1612; d. Paris 20 May 1695. He studied in Bourges under Jean Boucher and in Paris under Simon Vouet. In 1636 he went to Italy and spent most of his time in Rome, whence he was surnamed «The Roman» (Le Romain). He imitated Annibale Caracci, and among other portraits, including those of many Roman nobles, painted likenesses of Popes Urban VIII. and Alexander VII. In 1654 he went to Venice where his success as a portrait painter continued. On being summoned to Paris by Louis XIV. he painted portraits of the young king and of Mazarin and afterward was commissioned to decorate the cupola of the church of Val de Grace with over 200 figures of prophets, martyrs, etc. This work, the largest piece of fresco painting in France, soon lost the beauty of its coloring, owing to the painter's want of familiarity with the art of working on a wet plaster ground. He subsequently produced some paintings for the palace of Versailles and was made director of the royal art collection and superintendent of the manufacture of the Gobelin tapestry. His pictures suffer from the faults of his day; they are stiff and conventional; but glow with the warm and harmonious coloring of the Venetian school. His portraits are the best of the early French school. A remarkable collection of his works is to be found in the Louvre, but the Berlin Museum possesses the finest of his portraits, that of Maria Mancini. Consult Lebrun Dalbaune, 'Etude sur Pierre Mignard' (1878).

Mignet, François Auguste Marie, frăṅ-swā ō güst mä-rē mēn-yā, French historian: b. Aix, Provence, 8 May 1796; d. Paris 24 March 1884. He was educated at Avignon; studied law in Aix; went to Paris in 1822 after winning a prize from the Academy of Inscriptions by his essay on French institutions, government and legislation in the time of St. Louis; joined the staff of the *Courrier Français*; lectured on modern history at the Athenée; was elected to the Academy in 1836; and after the revolution of 1848 lost the place he had held for 18 years as archivist of the Foreign Office. His most important work was a 'History of the French Revolution' (1824). Besides this he wrote biographies of Franklin (1848), of Mary Stuart (1851), and of Charles V. (1854). Consult Trefort, 'Mignet und seine Werke' (1885).

Mignonette, mĭn-yō-nĕt', a genus (*Reseda*) of annual and perennial herbs of the order *Resedaceæ.* The species, of which there are about 50, are natives of western Asia and the Mediterranean region. They have simple or compound leaves, and terminal spikes of small, pale, usually greenish flowers. Less than half a dozen species are cultivated, the most important being the common mignonette (*R. odorata*), a universal favorite both in gardens and in greenhouses because of its fragrant flowers. It is a branching annual herb of decumbent habit when in its prime, and will thrive in any cool, moist, fairly rich soil, when partly shaded from the noon-day sun. For out-door blooming the seeds are sown successionally from early spring to midsummer, and for winter blossoming from that time forward at intervals of three or four weeks.

Mignot, mēn-yō', **Louis Remy**, American painter: b. Charleston, N. C., 1831; d. 1870. He began his studies in Holland in the studio of Schelfhout and returning to New York was elected a National Academician. He left the country during the Civil War and never returned. While he painted portraits, etc., his chief strength lay in the department of landscape. His most notable works are: 'Lagoon of Guayaquil, South America' (1863); 'Evening in the Tropics' (1865); 'Snow in Hyde Park'; 'Sunset off Hastings' (1870); and 'Chimborazo' (1871).

Migraine, or **Megrim** (also called hemicrania and, popularly, sick-headache and nervous headache), an affection marked by a painful headache, neuralgic in character, usually periodical, more or less unilateral, involving one side of the head or of the brow and forehead; and frequently associated with nausea and bilious vomiting. The predisposing causes are chiefly hereditary tendency, anæmia, a general want of tone, and the nervous temperament. Among the exciting causes are prolonged mental work, mental anxiety or excitement, grief, bodily fatigue, overlactation, late hours, sexual excesses, and improper food. Treatment requires rest, sometimes in bed; the allaying of pain by anodynes and hot applications; and removal of constipation and other abnormal conditions. In the intervals between the attacks efforts should be directed toward raising the general tone, and especially the strength of the nervous system.

Migration. The migrations of organisms are of two kinds, secular and seasonal. While certain mammals change their feeding grounds to a limited extent, and fishes as well as a very few insects are known to migrate, the habit of seasonal migration is especially characteristic of those birds which breed in the cooler parts of the earth. In the United States and British America nearly all the birds which breed in the central and northern portions fly southward in the autumn, and winter in the Southern States or in Central America, Mexico, and the West Indies. Thus the robin which has reared its young in Maine or Canada, may be seen in March near the timber line on the flanks of Popocatepetl. Most of the birds which breed in northern and central Europe take flight at the approach of cold weather into northern Africa, including Algeria and Egypt. On the other hand the Arctic birds after rearing their broods in high latitudes, seek more temperate climes and more open seas in the winter, where food is more available.

Migration of Birds.— The more typical seasonal migrants are the geese, ducks, shore and wading birds, and the woodpeckers and singing birds. The larger number of tropical birds and many extra-tropical forms, do not migrate. It is probable that in the Tertiary period, or just before the incoming of the Glacial period, when the polar regions were at least semi-tropical in their climate, there were no seasonal migrations. It is a habit which has sprung up since the present climates have prevailed, and is due to the fact that the ground becomes frozen, or covered with snow, so that the food supply is cut off, and storms and blizzards rage, with temperature too low for the existence of the less hardy species.

The routes by which birds migrate to and from their breeding places are quite definite, and lie along the coast lines, mountain ranges, or in great river valleys like that of the Mississippi. In the eastern United States the migrants returning from their winter quarters and seeking their breeding grounds in the north pass along the eastern slope of the Mexican plateau, and cross over from the West Indies. Here the route of travel is divided by the Alleghany ranges into two, one pathway extending along the Atlantic coast, up through New England and the Hudson River Valley; the other passing up the Mississippi, Missouri, and Ohio valleys. Another line of migration follows along the valleys and peaks of the Rocky Mountain ranges; another to the westward up the valley of the Rio Grande; and, lastly, one goes along the Pacific coast. In Europe and central Asia there are numerous routes, at least nine, according to Palmen. Of these one begins on the Siberian shores of the Polar sea, Nova Zembla, and the north of Russia, and passes down the western coast of Norway to the North Sea and the British Isles; another arising at Spitzbergen follows much the same course, but is prolonged past France and Spain to the west coast of Africa. Many migrants wintering in north Africa (Algeria, etc.) have flown there from northern Russia, by way of the Baltic Sea, Holland, passing up the Rhine Valley, and crossing to the Rhone, the column splitting on reaching the Mediterranean, one line of migration passing along western Italy and Sicily, a second crossing by way of Corsica and Sardinia, the third by southern France and eastern Spain. Egypt receives its winter visitors from the Russian river-valleys of the Obi and Volga, the line crossing the Black, Bosporus, and Ægean seas to the Nile Valley. Indeed, both in Eurasia and North America the birds follow the easiest and most protected lines of travel, flying in the line of least resistance.

It is supposed that a proportion of the birds fly at high elevations, in some cases at a height of one or two miles, thus passing over beyond ordinary vision. This is on clear and bright nights. In cloudy and stormy weather the birds fly low, and at such times «rushes» occur when great numbers becoming lost and confused dash against the windows of lighthouses. The rate at which birds sometimes fly is very great, if we are to credit Gatke's estimate. He states that curlews, godwits, and plovers will fly at the rate of about four miles a minute, or nearly twice as rapidly as our swiftest electric carriages. The carrier pigeon, a migrant, is known to fly at an average speed of 36 miles an hour, while in two of them a rapidity of about 55 miles was maintained for four consecutive hours. Of the night- and high-flying migrants we see but little. They are the nocturnal species, such as owls, the goat-suckers, and a large portion of small shy birds.

Causes of Migratory Movements.— As has been stated the initial cause of the migration of birds breeding in the Arctic and boreal regions was the incoming of the Glacial period and of the present low temperature of the Polar regions where the earth is frozen and snow-clad. The food-supply being cut off in the winter time, they are obliged to fly to regions where worms, insects, and seeds can be had. It is temperature and food that regulate the distribution of animals in general, and also their migratory movements. Newton says that in the North Temperate (holarctic) region every bird is to a greater or less degree migratory in some part or other of its range. Birds are less affected by extremes of cold and heat and other climatic influences than any other vertebrates, «provided only their supply of food is not affected thereby.» Competition also comes into play. Birds of prey customarily drive away their offspring from their own haunts as soon as they are able to get their own food, owing to the impossibility of both parents and progeny getting a livelihood in the same vicinity, and this applies to many other kinds. Newton thus accounts for the origin of waves of migration: As food grows scarce toward the end of summer in the most northern limits of the range of a species, the individuals affected thereby seek it elsewhere and thus press on the haunts of other individuals; these in like manner upon that of yet others, until the movement which began in the far north is communicated to the individuals occupying the extreme southern range of the species at that season. Other factors are the character or disposition of the species, and its wing power, and more especially the quest for suitable nesting and breeding places. This is satisfactory for the southward movement. It is more difficult to account for the almost unerring instinct or series of reflex activities, if one pleases, which lead the old and young birds to fly back to their birthplace. Is the initiative due to the sexual reflexes and instincts? and after the flocks are once started are they guided by the memory of the landmarks observed in their southward flight in the previous autumn? also does the increasing warmth of tropical regions at the end of winter, for example in northern Africa, Central America and the West Indies, urge them gradually to make their way northward as spring opens? We know that the migratory fishes, the salmon, cod, herring, etc., which live in deep waters in winter gradually as spring arrives and the shallower water becomes warmer, migrate inshore. The change of temperature also affects the sexual organs or glands, the eggs ripen, and this may incite them to seek spawning grounds near shore.

As for the cause which guides them along their accustomed routes, we can see that they are in part mechanical, due to reflex action, thermotropism, etc., and other tropisms, in response to changes of season, etc.; to obvious and safe routes, to the absence of physical barriers, while in fact they are guided by what is called the homing instinct, which is simply the result of observation and memory. If a limpet or crab will find its way back to its station, how much more readily should so keen and intelligent a creature as a bird be able to retrace its flight over a route which it had traveled a few months previous. To invoke a sixth sense, «the sense of direction,» seems quite unnecessary considering the bird's keen senses, its power of memory, together with the stimulus of the approaching mating season; hence we need not regard the return migratory flights as especially mysterious. A bee returns to its hive; a cat, dog, or horse travels back long distances to its accustomed haunts, orientating itself by the simple exercise of the acute senses with which it is endowed, plus the memory of land marks observed along the way.

Migrations of other Animals.— Whales, especially the sperm whale, have their regular migrations along the northeastern coast of North America and elsewhere, to and from the polar regions. The barren ground caribou migrates north at the beginning of summer, and southward in autumn. The Arctic fox in the Hudson Bay region is known to retreat southward in October, returning northward in the spring. There are also cases of sporadic and sudden migratory movements by squirrels, lemmings (q.v.), rats, mice, bison, antelopes, quaggas, etc. Among insects the migratory locusts come to mind. The Rocky Mountain locust is migratory in certain seasons favorable to the species when overproduction occurs; the young on hatching, after having devoured every green thing at hand, are forced, when becoming winged to rise in enormous swarms and sail on the wings of the wind for hundreds of miles to other regions where they lay their eggs. The next year's brood sometimes returns to the original spawning ground to lay their eggs.

Certain butterflies, as *Anosia plexippus,* and the cotton moth (*Aletia argillacea*) pass northward for hundreds of miles. Among other butterflies periodical migrations occur, as in movements of vast columns across the Isthmus of Panama out to sea, and flights miles in breadth have been observed to cross Ceylon, the individuals occupying several continuous days in their passage. Wallace observed the swarming of pierid butterflies in the Indian Ocean, and Clark in Venezuela, the vast throng composed of males moving steadily eastward for several days in the face of the trade winds.

Human Migrations.— Man probably originated in southeastern Asia at a time when Java was united to the mainland. From thence as he multiplied, and as the result of over-population, waves of migration spread over the highlands and interior of Asia, westward into Europe, and southward into Africa. Probably the North American Indians crossed from northeastern Asia into northwestern America. After the primary races became fixed, the white races of Europe and the Mediterranean region moved in successive waves of secular migration toward the Atlantic. The Anglo-Saxon people, as the result of over-population in the limited area between the mouth of the Rhine and Elbe, have spread over the world. But the yellow races have never passed far west of their present habitat.

Migrations in Geological Times, or Secular Migrations.— Owing to widespread geographical changes in Mesozoic and Tertiary times vast migrations took place. Thus the elephant order which it is now supposed originated in the Eocene epoch in Egypt, emigrated in later times into southeastern Europe and, spreading over Asia, reached North America by way of what is now Bering Strait, then a bridge of dry land, finally passing down in Pliocene times into South America. The camel family originating in western North America, sent waves of migration into South America, and also into Asia. The land-connection between what is now North America, Greenland, Iceland and Europe-Asia, allowed of further migrations and interchanges of mammals and doubtless of the lower animals. For example, in Miocene times America borrowed the bears, deer and cattle from Eurasia, but sent in exchange the tapirs, sabre-toothed tiger, rabbits and hares to what is now the Old World. As soon as the Isthmus of Panama connected North and South America extensive inter-migrations took place. Many of our insects, and birds, and mammals are of South and Central American origin. In the southern land (Antarctogæa) there were most probably during the Mesozoic and Tertiary periods land-connections between South America and Africa, and between Africa and Australia, and possibly there was a great antarctic land connecting these continents, or at least South America and Australia. These movements and migrations were the result of widespread geographical and topographical changes, involving the evolution, extinction and inter-migration of vast assemblages of plant and animal forms.

Consult Newton, article «Migration» in 'Dictionary of Birds' (London 1893–6); also the writings of Baird, Brewster, Cooke, Palmen, etc.

Alpheus S. Packard,
Late Professor of Zoology, Brown University.

Miguel, mē-gĕl', Dom **Maria Evaristo,** Portuguese pretender, son of John VI. of Portugal: b. Lisbon 26 Oct. 1802; d. Castle Bronnbach, Baden, 14 Nov. 1866. He was brought up in Brazil, and upon the accession of his father repeatedly raised rebellion as head of the Absolutists. In 1826 after his father's death he was made regent, but proclaimed himself king, attempted to keep Maria de Gloria, the real heir to the throne, who had been offered to him in marriage, out of the kingdom, and was successful until Dom Pedro of Brazil came to the aid of his daughter Maria, defeated Miguel and forced him to leave Portugal. Miguel is usually described by the faction hostile to him as ignorant, vicious and drunken, but his co-religionists make him a model prince.

Mijatovich, mē-yä'to-vĭch, **Chedomille,** Servian statesman and diplomat: b. Belgrade, Servia, 1842. He was educated at the universities of Munich, Leipsic, and Zürich, and in 1865 was professor of political economy at the High College of Belgrade. In 1869 he was general secretary in the ministry of finances and has continued in public life. He has been a senator since 1875, minister of finance, commerce, foreign affairs, delegate to various international conferences and ambassador to England in 1884, to Rumania in 1894 and again to England 1895-1900.

Mika'do (Japanese *Mi,* "exalted," *Kado,* "gate"), the ancient and poetic title of the Japanese emperor, in origin identical with "Sublime Porte" as used of the Ottoman sultan, that is, probably transferred to the ruler and judge from the gateway of his palace, at which he did justice. The word mikado was never used as a separate title for a spiritual ruler; the incorrect idea to the contrary results from the well-known historical fact that much of the temporal power of the mikado was long usurped by shoguns or generals, who, however, always admitted that they derived their power from the mikado. The present mikado, Mutsuhito (q.v.), is the 121st (or 123d) of his line, which dates back to 660 B.C.; of him the title "Mikado" is less used than Tenshi Sama, "Son of Heaven," or Shu-jo, "Supreme Master." See JAPAN.

Milan (mĭl'ăn) **I., Obrenovitch,** ō-brĕn'ō-vĭch, king of Servia: b. Jassy, Moldavia, 22 Aug. 1854; d. Vienna 11 Feb. 1901. In 1872 he began to govern as Prince Milan IV. He declared war against Turkey, suzerain power of Servia, in 1876, but was consistently defeated, and gained peace and security only by Russian interference. Having participated in the Russo-Turkish war, Servia was recognized as independent in 1878, and in 1882 proclaimed itself a kingdom, with Milan as ruler. In 1885, upon the union of Bulgaria and Eastern Rumelia, Milan made an invasion of Bulgaria, but was quickly driven back, and defeated at Slivnitza in Servia. This time Austria intervened to save his throne. On 6 March 1889 he abdicated and proclaimed his son Alexander king under the regency of himself. In 1892 he renounced the regency and took the title Count Takovo, and in 1898 was made generalissimo of the Servian army, though soon deprived of the post and banished from Servian territory. In 1875 he married Natalie Kechko, daughter of Colonel Kechko of the Russian army, from whom he was afterward divorced.

Milan, mĭl'an or mĭ-lăn', Italy, the capital of the province of Milan, an archiepiscopal city on the Olona, about 90 miles by rail northeast of Turin. It is situated in a beautiful and fertile plain between the Adda and Ticino, which feed several canals, one of which, encircling a considerable portion of the interior of the city, divides it into two unequal parts. The town is built in the form of an irregular polygon, and is surrounded, except on the castle side, by a wall or rampart called the Bastione, encircled on the outside by a fine road shaded by chestnut-trees. Suburbs have sprung up beyond this circuit, and the general railway-station is also outside. The city is entered by 11 gates, several of which are magnificent. The streets leading from these gates are wide, well paved, and lighted and traversed by electric street car lines; the lateral streets are less commodious. The houses are built mostly of brick, but have often a handsome and showy exterior. The principal street is the Corso Vittorio Emanuele, a prolongation of the new and handsome Corso Venezia, together leading from the cathedral to the Porta Venezia; other good streets are the Corso Porta Romana, Via Torino, Via Dante, etc. The chief square is the Piazza del Duomo, in which stands the Duomo or cathedral; and another is the Piazza della Scala. Besides fine public gardens (Giardini Pubblici) there is a large public park (Parco Nuovo) occupying an area that was long a drill-ground, and was previously the site of the citadel and connected works. This has been finely laid out and planted, and an artificial lake and mound have been constructed. Adjoining these is an amphitheatre, capable of containing 30,000 spectators. The castle — recently restored and now converted into a museum of art and antiquities — fronts the park on one side; at the opposite side is the Porta Sempione with the fine Arco Sempione or Arco della Pace, a triumphal arch of white marble.

Among the public edifices of Milan the first place belongs to the Duomo or cathedral, a magnificent structure, inferior in magnitude to St. Peter's at Rome, but in some respects not an unworthy rival. It is built of white marble, and though exhibiting a somewhat incongruous mixture of styles, in which the ancient Gothic occasionally gives way to the modern Italian, is one of the most impressive ecclesiastical edifices in the world. The Duomo in its present form was commenced in 1387, and is not yet entirely completed. Its form is that of a Latin cross, divided into five naves, terminated by an octagonal apsis, and supported by 52 octagonal pilasters of uniform size, except four, which, having to bear the cupola, are larger. Around the exterior are 4,500 niches, of which above 3,000 are already occupied by statues; in the interior everything is of the most imposing and gorgeous description. Among the other remarkable edifices are the church of Sant' Ambrogio, founded by St. Ambrose in 387, and though completely repaired in 1631, still retaining much of its original form, and containing many relics of the ancient building embedded in its walls; the churches of Sant' Eustorgio, San Lorenzo, Santa Maria della Grazie, with a cupola and sacristy by Bramante, and the celebrated 'Last Supper' by Leonardo da Vinci; Santa Maria della Passione, a majestic edifice, with excellent paintings and a magnificent mausoleum; San Paolo; San Carlo Borromeo, etc. Among the palaces are the Palazzo Reale or La Corte, adorned with numerous frescoes and surmounted by a lofty tower; the archiepiscopal palace, adjoining the cathedral; the Palazzo di Comando Militare; the Palazzo Marino, now the Municipio, a colossal structure; the Palazzo Ciani, completed in 1861, and adorned with heads of Victor Emmanuel, Garibaldi, etc.; and the Palazzo di Brera or Delle Scienze Lettere ed Arte, containing the Pinacoteca or picture-gallery, with a very valuable collection of paintings and statuary, and containing also the library of the Academy, 300,000 volumes. Besides this library Milan possesses the Ambrosian Library, the earliest, and still one of the most valuable public libraries in Europe. There is also a valuable museum of natural history, a conservatory of music, a military college, a theological seminary, and a veterinary school. The principal structure erected in recent times is the Galleria Vittorio Emanuele, a kind of covered street connecting the Piazza del Duomo with the Piazza of La Scala Theatre. It is 320 yards long, contains handsome shops, and is adorned with 24 statues of celebrated Italians. Milan has a number of theatres, among which that called La Scala takes precedence, accommodating 3,600 spectators. The principal benevolent endowments are the Ospedale Maggiore, richly endowed, and occupying a vast range of buildings in the Gothic style, with accommodation for 2,000 patients; several other hospitals for the cure of diseases, or the reception of the poor; and a vast lazaretto just outside the rampart. Since it formed part of United Italy no town has more rapidly increased in commercial and industrial activity than Milan. The spinning and throwing of silk employ a large number of hands. Other important articles of manufacture are machinery, locomotives and railway cars, boilers, electrical apparatus, tobacco, cotton, lace, carpets, hats, earthenware, white-lead, jewelry, etc. Besides these, corn, rice, cheese, and wines are the principal articles of trade. It is the see of an archbishop, the seat of courts of primary resort, criminal and mercantile courts, and a court of appeal for all Lombardy. The United States is represented by a consul.

The foundation of Milan is attributed to the Insubrian Gauls; but the first distinct notice of it occurs 221 B.C., when it was subdued by the Romans, under whom it acquired so much importance, that in the division of the empire attributed to Constantine the Great it ranks as the second city of Italy. In the middle of the 5th century it was sacked by the Huns under Attila, and again in the following century by the Goths. Greater horrors yet awaited it; and the Goths, who had been driven out by Belisarius, having regained possession by the aid of the Burgundians, gave it up to the flames, and put almost all its inhabitants to the sword. Having been rebuilt it again became very flourishing under the Lombards and Charlemagne. Arrogance grew with its prosperity, and Milan lorded it so haughtily over the neighboring towns and republics, that in 1162, when the Emperor Frederick I., whose supremacy it refused to acknowledge, had resolved to take summary vengeance, the inhabitants of Pavia, Cremona, Lodi, Como, and Novara eagerly hastened to the task, and razed it to the ground. The cruelties practised produced a reaction, and in 1167 the famous Lombard League was formed at Pontita, and among other important results succeeded in bringing back the Milanese; and the city again rebuilt became even more populous and influential than before. It long continued, however, to be torn by internal factions, headed by the leading nobility, among whom the Visconti at last gained the ascendency, and ruled it from 1395 till 1447. They were succeeded by the Sforzas, whose rule ended in 1535. Milan passed next into the possession of the Spaniards. At the close of the war of Succession it was allotted to Austria (1714). Under Bonaparte it became the capital of the Cisalpine Republic, of the Italian Republic, and of the Italian Kingdom. In 1815 it was restored to Austria, and continued the capital of the Austro-Italian Kingdom until 1859, when by the Peace of Villafranca Lombardy was ceded to Piedmont. Pop. about 500,000.

Milan, mī'lạn, Mo., town, county-seat of Sullivan County; on the Quincy, O. & K. C. and the Chicago, B. & K. C. R.R.'s; about 100 miles east by north of Saint Joseph. It is in an agricultural and stock-raising region, and in the vicinity of bituminous coal fields. The chief manufactures are flour and lumber. Milan is the headquarters of a division of the Quincy, Omaha & Kansas City railroad, and the shops of the road are located here. The trade is principally live-stock, grain, lumber, and flour. Pop. 2,000.

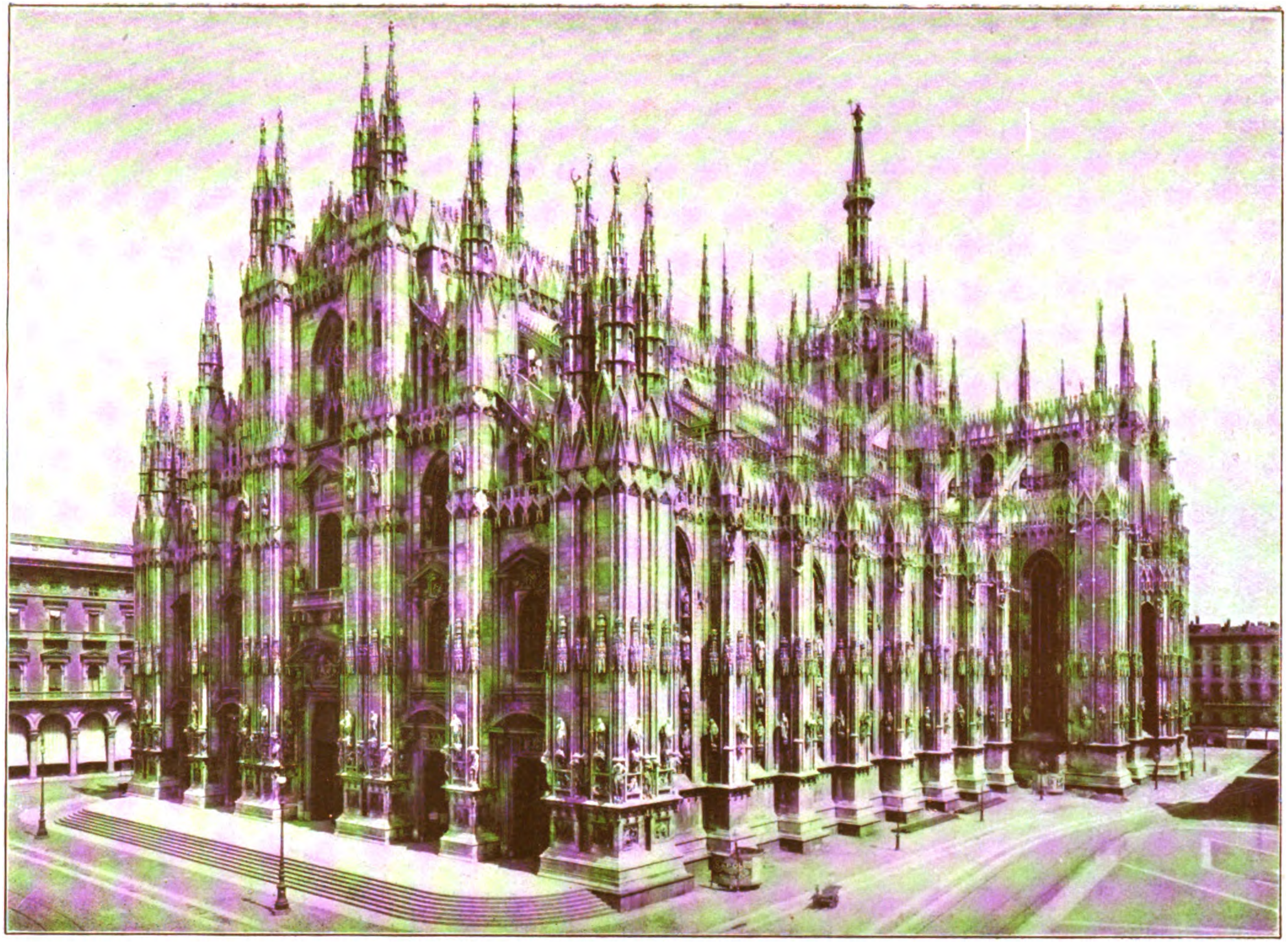
Milan, Tenn., city in Gibson County; on the Illinois Central and the Louisville & N. R.R.'s; about 95 miles northeast of Memphis. It is in an agricultural and lumbering region; the principal products are cotton and fruit. The chief manufacturing establishments are flour-mills, fruit-canning works, cotton gins, and barrel factory. It has a college and good schools. Pop. 1,700.

Milan Decree, issued by Napoleon I., at Milan, 18 Feb. 1801, cutting off Great Britain from all connection with the Continent.

Milan Edict, issued by Constantine the Great at Milan, 313 A.D., granting toleration to Christianity and all other religions in the Roman empire.

Milanés y Fuentes, José Jacinto, hō-sā' yā-kēn'to mē-lăn'ās ē fwăn'tās, Cuban poet: b. Matanzas 16 Aug. 1814; d. there 14 Nov. 1863. He was self-taught, being a poor clerk and later a blacksmith's helper. But when he was 19 some of his verses were published, and his excellent drama, 'El Conde Alarcos,' which appeared in 1838, won him a comfortable position. Several other plays followed, notably 'Una Intriga paternal.' But his early hardships had undermined his reason; he traveled for relief in the United States and in Europe in 1848 and 1849, and spent his last years in melancholia broken only occasionally by intelligent literary effort. Consult the biographical sketch in the 'North American Review' for 1849.

Milazzo, mē-lăt'sō, or **Melazzo,** Sicily, a fortified seaport city in the province of Messina, on a promontory 21 miles by rail west of Messina. It has a good harbor and carries on a trade in fruit, wine, cattle, fish, and sulphur. Milazzo is the ancient Mylæ off which in 260



MILAN CATHEDRAL.

Univ. Library, UC Santa Cruz 2001

B.C. the Romans won a great sea-fight over the Carthaginians. Here also Garibaldi, 20 July 1860, with 2,500 men, defeated 7,000 Neapolitans, and compelled the garrison to evacuate the fortress.

Mil'burn, William Henry, American clergyman: b. Philadelphia 26 Sept. 1823; d. Santa Barbara, Cal., 10 April 1903. At 5 he suffered an accident which caused partial and finally complete loss of sight. He was educated at Illinois College (Jacksonville, Ill.); in 1843 became a Methodist itinerant preacher; was largely active in the South; and for a time had charges at Montgomery and Mobile, Ala. In 1845 he was elected chaplain of the House of Representatives, and he served as such in 1853, 1885 and 1887. In 1893 he was made chaplain of the Senate. He lectured with success throughout the United States and in 1859 in Great Britain. He was generally known as the "blind preacher." Among his writings are: 'Rifle, Axe, and Saddle-Bags' (1857); 'Ten Years of Preacher Life' (1859); and 'Pioneers and People of the Mississippi Valley' (1860), all based on his Western experiences.

Mil'dew, specifically, any fungus belonging to the group *Erysiphaceæ*, the powdery or true mildews, and *Peronosporaceæ*, the downy or false mildews; loosely, many plant diseases, especially the rusts and smuts of cereals, and some not of fungous origin; vaguely, molds of any kind upon preserved fruit, clothing, walls, or other materials, the origin of which is more or less organic. The powdery mildews develop mostly upon the outside of the host plants, which they enter only by means of their sucking organs of attachment (haustoria). In warm weather they develop innumerable spores upon erect branches and later produce thick-walled resting spores which germinate in the spring. Upon the host plants they usually appear as a sort of bloom, but later they often cause distortion of the leaves and not infrequently the death of the host. Being mainly upon the surface they may be combated with any fungicide (q.v.), and often with sulphur, either in the form of powder or vapor (not burned) evaporated without flame. This method is widely practised in greenhouses. Some of the best known are rose mildew (*Sphærotheca pannosa*), gooseberry mildew (*S. mors-uvæ*), hop mildew (*S. castagnei*), cherry, pear and apple mildew (*Podosphæra oxycanthæ*), wheat mildew (*Erysiphæ graminis*), and grape mildew (*Uncinula spiralis*).

The downy mildews all live within the tissues of the host plant, appearing outside the surface only when producing summer spores (conidia) which usually give a downy appearance to the infected spots. The resting spores are produced internally and make their escape in the following season when the tissues of the host (leaf or other part infected) have decayed. They cannot be combated like the preceding, because of their habit of feeding internally. Fungicides (q.v.) may be applied to prevent attacks, however, and this, together with the destruction of leaves in autumn and general cleanness of the premises are believed to be the only safeguards. Among the best known and most destructive are: Potato rot, blight, or mildew (*Phytophthora infestans*), lettuce mildew (*Bremia lactucæ*), damping-off fungus (*Pythium debaryanum*), downy mildew of the grape (*Plasmopara viticola*), radish mildew, also found on other members of the *Cruciferæ* (*Cystopus candidus*), melon and cucumber mildew (*Plasmopara cubensis*) and onion mildew (*Peronospora schleideniana*).

The rusts and smuts which are sometimes called mildews are discussed elsewhere. The mildews, so-called, which appear upon leather, wall-paper, cloth, etc., belong to various other groups. Since they are generally seen only where dampness prevails, especially in cellars and closed rooms or houses, they may be prevented more or less effectually by the adequate ventilation of such places. And having gained a foothold in these places they may be destroyed by liberal applications of whitewash, in which copper sulphate or sulphur have been mixed, or where this cannot be applied, by burning sulphur in the closed quarters. This last remedy may also be used where cloth is attacked. Awnings, sails, etc., should be thoroughly dry before being stored or folded for any considerable time. They may also be soaked in a solution of copper sulphate and then dried. Until this is washed out by rain it will act both as a preventive of attack and will often save fabrics if not too far gone.

Mile (Latin *mille*, a thousand, a Roman mile being 1,000 paces), a measure of length or distance. The English statute mile, fixed in the reign of Queen Elizabeth, is 1,760 yards. The geographical mile, which is commonly used by the navigators of all nations, is one sixtieth part of a degree at the equator. In many countries the kilomètre (kilometer) now holds the same position as the English statute mile in Britain. The following are some of the principal standards of miles or leagues which are or have been in use in the principal countries of Europe:

Kilomètre	1,093.6	yards.
Ancient Roman mile	1,614	"
Modern Roman mile	1,628	"
English statute mile	1,760	"
Tuscan mile	1,808	"
Ancient Scottish mile	1,984	"
Geographical mile	2,028.4	"
Italian mile	2,028.4	"
Irish mile	2,240	"
French posting league	4,263	"
Spanish league (judicial)	4,635	"
French league	4,860	"
Portuguese league	6,760	"
German short mile	6,859	"
Flanders league	6,864	"
Spanish league (common)	7,416	"
German geographical mile	8,113.6	"
German (new imperial)	8,202	"
Old Prussian mile	8,237	"
Danish mile	8,244	"
Swiss mile	9,153	"
German long mile	10,126	"
Swedish mile	11,700	"

The English statute mile is generally used in the United States.

Mileage, a term used in the United States, for fees paid to certain officials, such as members of Congress, of State legislatures, special commissioners and others, for their traveling expenses, at so much per mile. The system has led to gross abuses, each senator and representative estimating for himself the distance he had traveled. There is now a fixed table of mileage, and the total annual cost, for both houses of Congress, is nearly $150,000. In all countries of Europe, except Great Britain, the same system prevails with regard to members of the popular chambers, at least, they being paid either their traveling expenses or a fixed annual sum. The term mileage is also applied in the United States to railroad transportation, sold in tickets good for 1,000 miles of travel. These tickets are issued in book form, convenient for the pocket, and are known to travelers as mileage books. In 1903, a system of interchangeable mileage tickets were issued, good for transportation on any one of eight different railroad lines in the Eastern States.

Milelli, Domenico, dō-mā'nē-kō mē-lĕl'lē («CONTE DI LARA»), Italian poet: b. Catanzaro, Italy, 1841. He was educated for the priesthood, but finding literature more to his liking turned his attention to writing, which is in subject of a paganish character, and he is one of the leaders of the class called *Veristi*. Among his works are: 'In giovinezza' (1873); 'Odi pagane' (1879); 'Il rapimento di Elena' (1882); 'Verde antico' (1885).

Miles, George Henry, American dramatist: b. Baltimore, Md., 31 July 1824; d. Thornbrook, Md., 23 July 1871. He was graduated from Mount St. Mary's College, Emmitsburg, Md., and practised law in Baltimore for several years, after which he devoted himself to literature. In 1850 his 'Mohammed' was awarded the $1,000 offered by Edwin Forrest for the best drama by an American author. In 1859 he was appointed professor of English literature at Mount St. Mary's College, where he remained until his death. His works comprise: 'Señor Valiente' (1859); 'Christine, a Troubadour's Song' (1866); 'Abu Hassan the Wag' (1868), etc.

Miles, Nelson Appleton, American army officer: b. Westminster, Mass., 8 Aug. 1839. He was a clerk in a Boston mercantile house at the outbreak of the Civil War in 1861; and left his business to raise a company of volunteers, and enter the army as lieutenant in the 22d Massachusetts regiment. In 1862 he was promoted to the rank of colonel, commanding the 61st New York regiment. He was engaged in the battles of the Peninsula, before Richmond, and at Antietam, and in every battle of the Army of the Potomac, with one exception, until the surrender of Lee at Appomattox Court House. He was distinguished in the battles of Fair Oaks, Malvern Hill, Fredericksburg, Chancellorsville, Wilderness, Spottsylvania Court House, Reams Station, Richmond Campaign of 1864, and many other important battles of the war; and, at one time, at the age of 25, was in command of the Second army corps, numbering 25,000 men. He was wounded three times, most severely at the battle of Chancellorsville. In May 1864 he was promoted brigadier-general, and in 1865 major-general of volunteers.

At the close of the war he entered the regular army and was commissioned colonel of the 40th United States infantry; and attained the rank of brigadier-general in 1880, and of major-general in 1890. He successfully conducted several important campaigns against the Indians, and did much to open up for civilization large portions of the West. In 1874 and 1875 he defeated the Cheyennes, Kiowas, and Comanches in the Staked Plains country; he also subjugated the hostile Sioux and other Indians in Montana, driving Sitting Bull across the frontier and breaking up the bands that were led by him and other chiefs. In December 1877, after a forced march over a distance of more than 160 miles, he captured Chief Joseph and his tribe of Nez Perces after a hard-fought battle of four days in northern Montana; in 1878 he intercepted and captured Elk Horn and his band on the edge of the Yellowstone Park. In 1886 he subjugated and forced to surrender Geronimo, Natchez and the band of Apaches that had made a large portion of the Southwest uninhabitable, thus restoring peace and prosperity to Arizona and New Mexico. For his services up to this time he received the thanks of the legislatures of Kansas, Montana, New Mexico and Arizona. Later he settled the Indian troubles in the Dakotas, saving the country from a serious war that had threatened it for years. In 1894 he was in command of the United States troops sent to Chicago at the time of the railroad strike; and in October 1895 succeeded to the command of the United States army. He represented the army at the scene of the Turco-Grecian war, and at Queen Victoria's Diamond Jubilee in 1897. In 1898 he conducted the brief campaign in Porto Rico with ability, taking possession of the island with trifling loss; and in June 1900 was promoted to the rank of lieutenant-general. In December 1901 he was officially reprimanded for publicly expressing his approval of Admiral Dewey's report on the Schley case. In 1902 he made a tour of inspection to the Philippines, and on his return filed a report which called forth considerable controversy by its denunciation of some of the abuses he had found in the conduct of military affairs there. In August 1903 he was retired from active service. He has written 'Personal Recollections' (1896); 'Military Europe' (1898), besides magazine articles and official military reports.

Miles O'Reilly. See HALPINE, CHARLES GRAHAM.

Milesians, mī-lē̆'shĭ-ạnz, or mī-lē̆'zhạnz, early colonists of Ireland, a portion of whose inhabitants, according to Irish tradition or legend, are descended from Milesius, a fabulous king of Spain, whose two sons conquered the island several thousand years before Christ, establishing a new nobility. This was the last of the traditional prehistoric colonizations of Ireland.

Miletus, mī-lē'tŭs, Asia Minor, an ancient city opposite the mouth of the Meander on the Latmic Gulf, which, inhabited by Carians, was in existence prior to the colonization of the coast by the Ionians. The Ionians are said to have taken forcible possession of the town, massacred the men, and taken the women as their wives. The extent of the harbors of Miletus, one of which could contain a large fleet, soon raised the town in the hands of the Ionians to a place of importance, and it became one of the first cities and republics of Asia Minor. Its commerce covered the Mediterranean, and extended to the Atlantic. It had upward of 75 colonies, most of which were on the coasts of the Euxine. On the rise of the Lydian kingdom repeated attempts were made to conquer it. It finally recognized the sovereignty of Crœsus, and paid tribute. A similar arrangement was made with Cyrus, which saved it the calamities of a contest with the Persians. Civil dissension, however, had long been rife. The Persians were compelled to intervene, and committed the government to the most peaceable land-owners. The city revolted against the Persians 500 B.C. It was taken by storm 494 B.C., was plundered, and the inhabitants massacred or transported. It recovered its independence in 479 B.C., after the battle of Mycale. It yielded for a time to the supremacy of Athens, but ultimately threw off the yoke. It stood an assault by Alexander the Great 334 B.C., part of the city was destroyed, but the conqueror did not interfere with its government. From the time of its subjugation by the Persians it had never recovered its early importance; but it still continued to enjoy some commercial prosperity under the Romans until the time of St. Paul, who visited it twice, as recorded in Acts xx. 17 and 2 Tim. iv. 20. It was finally taken and destroyed by the Turks. From the change made on the coast by the deposits of the river the site of the city was with difficulty excavated by the Berlin Museum in 1899, and the foundations of various parts of the city exposed.

Mil'foil, or Millefoil. See YARROW.

Milford, mĭl'fōrd, Conn., town, in New Haven County; at the mouth of Wepowaug River, on Long Island Sound, and on the New York, N. H. & H. railroad; about 10 miles southwest of New Haven. The place was settled by people from Wethersfield and New Haven in 1639. The Indian village was called Wepowage. Milford became a part of the "Colony of New Haven" in 1644, and in 1664 the town became a part of Connecticut. The chief industries are oyster cultivation, farming, seed-growing, the manufacturing of electrical supplies, telephone apparatus, shoes, straw hats, and silverware. It has a beautiful, well-kept park, several fine churches and school buildings, and the Taylor Library, which has about 10,000 volumes. In 1889, on the 250th anniversary of the settlement of Milford, a Memorial Bridge was erected. Pop. (1910) 4,366.

Milford, Del., town, in Kent and Sussex counties; on Mispillion River, and on the Philadelphia, B. & W. railroad; about 62 miles south of Wilmington. A settlement was made herein 1678-9 and in 1787 the town was incorporated. It is the trade centre for a fertile agricultural region in which fruit growing receives special attention. The industries of the town are connected with the farm and orchard products. Pop. (1910) 2,603.

Milford, Mass., town, in Worcester County; on the Charles River, and on the New York, N. H. & H. and the Boston & A. R.R.'s; about 17 miles southeast of Worcester. It was settled in 1669 and was then a part of the East Precinct of Mendon. On 11 April 1780 it was incorporated as a separate town. It is in an agricultural region, but the town has considerable manufacturing interests. In the vicinity are large granite quarries. The chief manufactures are foundry and machine-shop products, silk, boots and shoes, thread, boot and shoe trees, straw goods, and bone cutters. The granite quarries contribute to the industrial wealth of the town. The town has a fine high school, good public and parish schools, and a public library. Town meetings, held usually twice a year, administer the government. Pop. (1910) 13,055.

Milford, N. H., town, in Hillsboro County; on Souhegan River, and on the Boston & M. and the Fitchburg R.R.'s; about 27 miles south by west from Concord, and 15 miles southwest of Manchester. The chief industries are connected with manufacturing, quarrying granite, lumbering, and agriculture. The principal manufactures are flour, leather, lumber, piano keys, harnesses, furniture, quarry machinery, soap, paper boxes, wagons, and carriages, and dairy products. The trade is in the manufactured articles, farm products, and granite. Pop. (1910) 3,939.

Milford, Pa., town, county-seat of Pike County; on the Delaware River, and on the Erie railroad; about 45 miles east of Scranton and 8 miles southwest of Port Jervis. It is situated in a portion of the Delaware Valley noted for its beautiful and picturesque scenery. The Sawkill Falls and the Cliffs are in the vicinity, and on the northwest and south of the town are mountains. Three miles south are the falls of the Raymonds Kill and 14 miles south are the cataracts of Big and Little Bushkill creeks. Milford is one of the pre-Revolutionary places, but it was not made a separate township until 1800. It is a favorite resort for hunting parties. Many of the legends and stories connected with the place may be found in 'Pike County Ballads,' by E. Mott. Pop. about 900. In summer the population is over 6,000.

Milford, Wales, a seaport town of Pembrokeshire on the celebrated Milford Haven, one of the safest, deepest, and most capacious harbors in Britain, forming a deep indentation in the southwest coast of the county. The haven stretches about 10 miles from east to west, with a breadth of from one to two miles, and branches off into numerous bays, creeks, and reaches. The largest vessels can enter and put to sea in any wind or at any tide more expeditiously than from almost any other large harbor in Great Britain, and it has long been proposed to make Milford the eastern seat of the transatlantic trade, as bringing London nearer by several hours. The haven is defended by fortifications. The town of Milford on the north shore, eight miles northwest of Pembroke and six miles from the mouth of the haven, has extensive modern docks and a busy agricultural and domestic trade with Irish ports. Pop. about 6,000.

Milford, Engagements at. Milford, Va., on the east bank of the south branch of the Shenandoah, was the scene of several skirmishes and three cavalry engagements during the Civil War. On 24 June 1862 detachments of the 1st Maine and 1st Michigan cavalry attacked about 300 mounted Confederate infantry at the place, without decisive result, and withdrew. When Sheridan, after the battle of the Opequon (q.v.), followed Early up the valley, he ordered Gen. Torbert, commanding the cavalry, up the Luray Valley, to get past Early's right and cut off his retreat. Wilson's division advanced and 21 Sept. 1864 attacked Wickham's cavalry division of two brigades and drove it from Front Royal and up the valley to Milford, where Wickham took up a strong defensive position on the south side of Milford Creek, one flank on the Shenandoah and the other on a knob of the Blue Ridge. When Torbert came up on the 22d he concluded that the position was too strong to be attacked, and not knowing that Sheridan had attacked Fisher's Hill (q.v.) fell back to near McCoy's Ferry, again advancing, and on the 23d occupying Milford, which had been abandoned by Wickham. Sheridan was greatly disappointed at Torbert's failure to carry the place on the 22d. After the battle of Cedar Creek (q.v.) 19 Oct. 1864, Milford was occupied by Lomax's Confederate cavalry division, and its defenses strengthened. On 24 October Powell's cavalry division, two brigades of about 1,100 men, with six guns, moved up the Luray Valley to reconnoiter. Powell skirmished with Lomax's outposts on the 25th, and on the morning of the 26th attacked Lomax in position at Milford, using his artillery freely, and continuing the contest until 2 P. M., when, finding the defense so stubborn and the position too strong to be carried, he withdrew. E. A. CARMAN.

Milfort, Le Clerc, lĕ klărk mĕl-fŏr, or mĭl'-fōrt, French adventurer: b. Mezières, France, about 1750; d. there 1817. He came to America, traveled through the colonies, and about 1776 visited the Creek Indian nation. Here he attached himself to the Creek chieftain, Alexander McGillivray, whose sister he married. He was made a war chief by the Indians, was called Tastanegy, or «great warrior,» and was in active service against the Whigs of Georgia during the Revolution. He remained with the Creeks for 20 years. In 1796 he returned to France, and was made a general of brigade by Bonaparte. He wrote, or perhaps merely furnished material for, the interesting 'Mémoires, en Coup-d'œil Rapide, sur mes Voyages dans la Louisane, et mon Sejour dans la Nation Creeke' (1802).

Milia'ria (MILIARY FEVER, MILLET-SEED RASH, PRICKLY HEAT), a very common fine papular or papulovesicular eruption. It is caused by too profuse sweating attended by undue congestion of the skin. Hot weather, excessive clothing, vigorous exercise, alcoholic dissipation commonly evoke the disease, especially in those who are debilitated or who have a delicate skin. It may appear and disappear rapidly without any apparent cause. Its appearance is attended by pricking, burning, or itching sensations. It is generally limited to a portion of the trunk, but may appear upon the face, neck, and extremities. Fresh crops may follow one another. In subsiding the vesicles become opaque and yellowish white.

Mil'iary Fever. See MILIARIA.

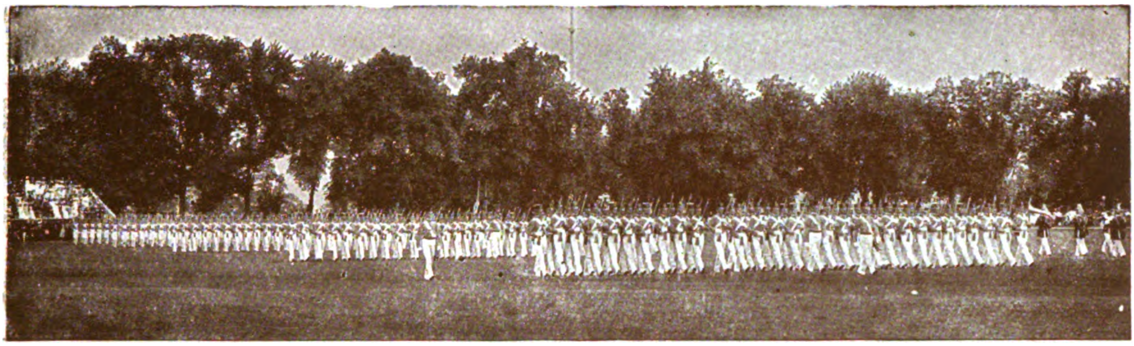
Milicz, mĕ'lĭch, or **Militz, Johann,** Moravian reformer: b. Kremsir, Moravia, about 1325; d. Avignon, France, 29 June 1374. He entered the Roman Catholic priesthood in 1350 and in 1360 became canon at the Cathedral of St. Vitus in Prague, and was appointed secretary to Charles IV., who took him to Germany. Becoming convinced of the hollowness of court and church life, in 1363 he resigned and began to preach to the lower classes in Prague in their own tongue, instead of the Latin, and gained over them a wide influence. Convinced that Antichrist had arrived and that the day for reform was at hand, he went to Rome that he might consult the pope, and was arrested by the Inquisition, but was released, and was well received by Urban V. Upon his return to Prague he resumed his preaching, but in 1372 he was accused of heresy by his brother priests and summoned to Avignon for trial. He proved his innocence, but died before the verdict was rendered. Consult Palacky, 'Die Vorläufer des Hussitenthums' (1869).

Mil'itary. See ARMY; ARMY OF THE UNITED STATES.

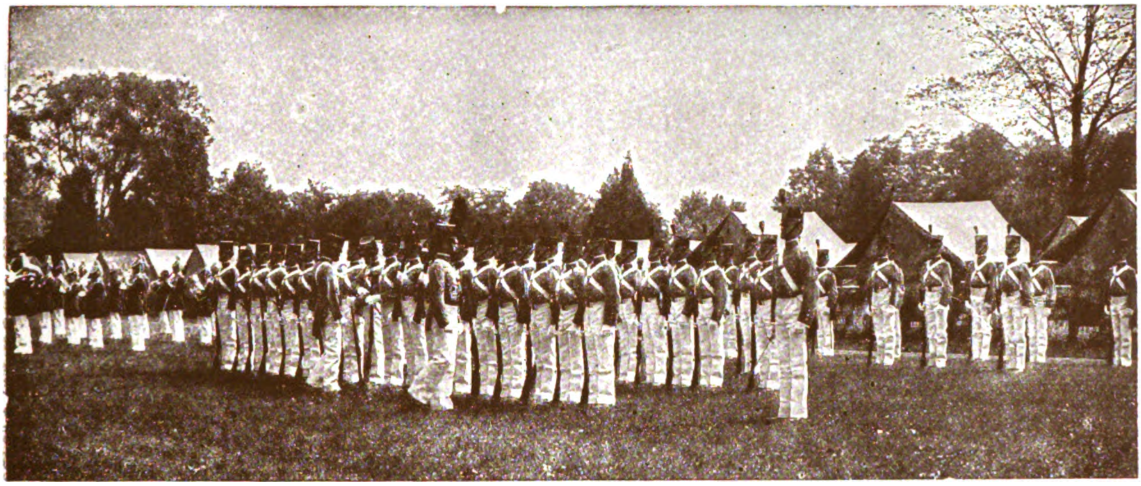
Military Academy, Royal, an institution at Woolwich, England, where candidates for the Royal Engineers and the Royal Artillery of the British army receive their finishing education. See MILITARY SCHOOLS.

Military Academy, United States. From the first outbreak of the War of the Revolution the necessity for trained artillerists and engineers was manifest. The want was supplied so far as possible by importing foreigners, chiefly Frenchmen. It was evident from the first also that the United States should maintain a school for educating Americans for command and especially for the regular duties of the scientific branches of the service. Two plans were suggested; the first was to establish a military academy with a fixed home, where pupils (cadets) would be educated chiefly in the theory of war, leaving the practice to be gained in actual service; the second was to organize a school of practice for young officers who would also study the theory of their profession. General Henry Knox, chief of artillery, was the first to propose the former plan which is that on which the United States Military Academy is organized. In a report to a committee of Congress (27 Sept. 1776) he advocated an Academy «nearly on the same plan as that of Woolwich.» Knox's views were afterward supported by Alexander Hamilton, and approved by General Washington. The plan of Knox was not carried out until 1802 when the United States Military Academy was established at West Point. The alternative plan was adopted in 1777.

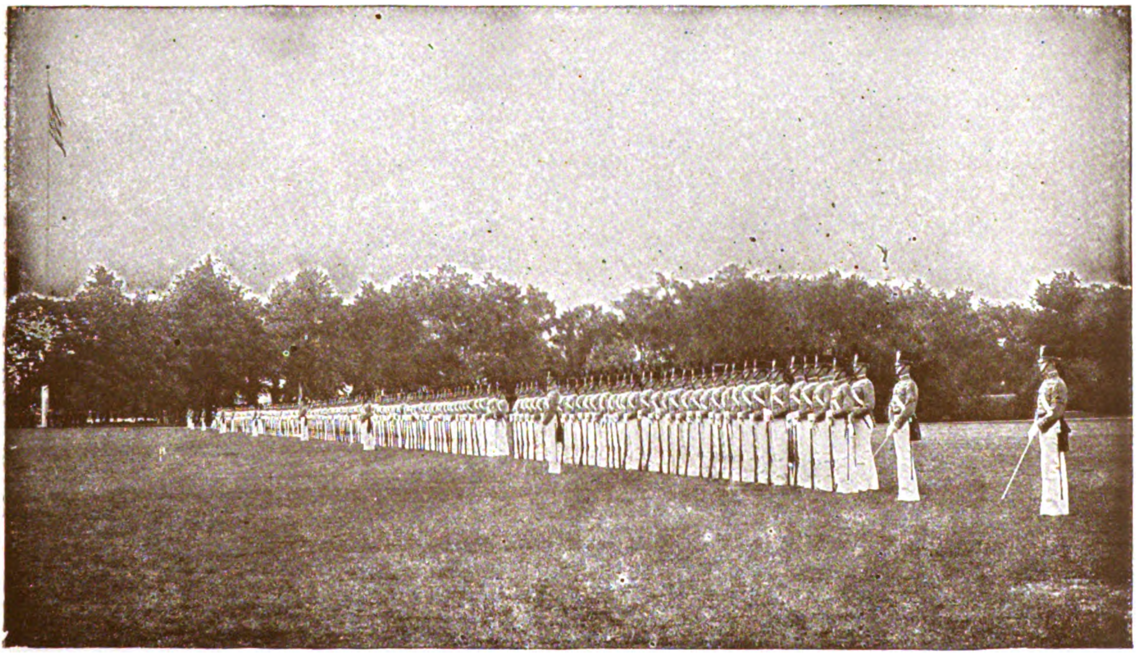
The occupation of West Point as a military post took place 20 Jan. 1778, and has been continuous since that date. As early as 1 Oct. 1776, Congress passed a resolution appointing a committee to prepare a plan for «A Military Academy at the Army.» The result was the resolution of 20 June 1777, providing for a Corps of Invalids (veterans) «to serve as a military school for young gentlemen previous to their being appointed to marching regiments.» The Invalid Corps was organized in July 1777, and in 1781, at the request of Washington, was marched from Philadelphia to form part of the garrison at West Point, where an engineer school, a laboratory, and a library had been established in three separate buildings. In 1783, after the cessation of hostilities, Washington, having been called upon for his views as to the peace establishment, laid the matter of a Military Academy before his officers at Newburg. He referred to it again in his message of 3 Dec. 1793. The law of 9 May 1794 authorized the organization of a Corps of Artillerists and Engineers with two cadets to a company, thus creating the new grade of «cadet» in the American army. A school for the artillerists and engineers and for the cadets attached to them was established, on the recommendation of Washington, by order, at West Point, in 1794. The destruction of its buildings by fire in 1796, however,



REVIEW FOR THE PRESIDENT OF THE UNITED STATES.



GUARD MOUNT—DAILY MORNING INSPECTION OF DETAIL FOR SENTRY DUTY.



DRILL EXERCISES AT WEST POINT—DRESS PARADE.

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caused its suspension. On 20 July 1801, the Secretary of War directed that all the cadets of the corps of artillerists should report at West Point for instruction, and on 1 Sept. 1801 a school was opened with four army officers and a civilian as administrators and instructors.

Washington was firmly convinced of the necessity of establishing a Military Academy, and it was due to his efforts, and those of other patriots of the Revolution that the Academy was created by Act of Congress approved 16 March 1802. The Act authorized the President to organize and establish a Corps of Engineers to consist of five officers and ten cadets and provided that it should be stationed at West Point, in the State of New York, and should constitute a Military Academy. The Academy, with ten cadets present, was formally opened 4 July in the year of the Act.

Acts of Congress, in 1802 and 1808, authorized 40 cadets from the artillery, 100 from the infantry, 16 from the dragoons, and 20 from the riflemen; but few of these were appointed, and no provision was made for them at the Academy. In 1810 the Academy was deprived of nearly all means of instruction, and officers and cadets had difficulty in obtaining their pay. During most of the year 1811, and a part of 1812, although war was imminent, academic instruction was practically abandoned. In March 1812 the Academy was without a single instructor. Up to and including this time, 88 cadets had been graduated; they had entered without mental or physical examination, at all ages from 12 to 34, and at any time of the year.

By Act of Congress of 29 April 1812, the Academy was reorganized. The provisions of this Act have furnished the general principles upon which the Military Academy has since been conducted and controlled; a more adequate corps of professors was authorized; a maximum of 250 cadets was fixed; and the age and the mental requisites for admission were prescribed.

In 1817, under the provisions of the Act of 1812, and the able superintendency of Major Sylvanus Thayer, Corps of Engineers, the present era in the Academy's history began.

Until 1843, a prescribed residence was not a legal qualification for appointment, but the selection of one cadet from each Congressional district had grown to be customary. In this year the custom became the law, Congress prescribing that the corps of cadets should consist of one from each Congressional district, one from each Territory, one from the District of Columbia, and ten from the United States at large, to be appointed by the President.

By Acts of Congress approved 6 June 1900, 28 June 1902, and 3 March 1903, the Corps of Cadets consists of one from each Congressional district, one from each Territory, one from the District of Columbia, one from Porto Rico, two from each State at large, and forty from the United States at large, all to be appointed by the President and, with the exception of the forty appointed from the United States at large, to be actual residents of the Congressional or Territorial districts, or of the District of Columbia, or the States, respectively, from which they are appointed. Under these Acts, and under the apportionment of Members of Congress according to the 12th census, the maximum number of cadets is 522.

The total number of graduates from 1802 to 1903, inclusive, is 4,214.

Under Thayer, the Academy assumed a form which has remained essentially unchanged for nearly a century. The heads of the scientific departments (mathematics and the like) are permanent, of the professional departments (ordnance and the like) are detailed from the Army for a term of four years. The instructors in all departments are army officers detailed for the purpose — about one instructor to ten cadets. All cadets follow the same fixed curriculum and all graduates are prepared for the duties of all arms of the service therefore — a peculiarity of this school. The cadets are divided into small sections for instruction, and each is called upon to recite every day. The instruction is therefore unusually thorough, so far as it goes. A «mark» is given for each recitation and the sum of a cadet's marks determines his standing in his class. Upon this standing his first promotion in the army depends. The upper men of each class — five or more — are assigned, upon graduation, to the Engineers, the next to the Artillery, the lower half of the class to the Cavalry or Infantry. All have, however, been educated to the duties of every branch and the high excellence of the American army officer depends upon this fact.

The first object of the school is to form character. Habits of faithfulness, promptness, cheerful obedience, attention to duty first, last and all the time, are insisted on. The whole conduct of each cadet is registered by «demerit marks.» Small privileges are granted for good conduct. Small punishments — such as confinement to quarters — are given for offenses. The punishments follow closely on the offense. The cadet adjusts his standard of conduct to the regulations of the Academy precisely as a child adjusts its conduct to the law of gravity. There are, for example, some 18,000 opportunities for a cadet to be late at roll call during his stay at the Academy. For every «late» he will receive one demerit. If he receives 215 for all offenses in any 12 months he is discharged. Promptness thus becomes a fixed habit, and other practical virtues are inculcated in the same way. A high standard of truthfulness and honor is insisted upon, which in the officer becomes a standard of honesty. The record of graduates in this respect is extraordinarily bright.

The services of the graduates in war are well known. Speaking of the Mexican War, General Scott said: «I give it as my fixed opinion that but for our graduated cadets, the war between the United States and Mexico might, and probably would, have lasted some four or five years, with, in its first half, more defeats than victories falling to our share; whereas, in less than two campaigns, we conquered a great country and a peace, without the loss of a single battle or skirmish.»

Two hundred and ninety-one of the 4,000 graduates have become general officers. Every great battle of the Civil War except two was fought under the command of a graduate. The Army Register of 1861 contains the names of 753 graduates on the active list; 150 joined the army of the Confederacy — about 20 per cent. Nearly *one half* of the army officers appointed from civil life did so, and almost all the United States Senators, Representatives, Judges and civil officials appointed from Southern States.

The loyalty of the graduates of the United States Military Academy in that trying time, measured by percentages of the sort, was far greater than that of any other group of men except the graduates of the Naval Academy, whose record in this respect is nearly, though not quite, as good as that of the United States Military Academy. The work of the graduates in the Spanish-American War of 1898 and in the China Expedition of 1900 was admirable in every respect.

The services of graduates in civil life have been equally brilliant. In the early days of the Academy it was the chief engineering school of the country. Its graduates surveyed and located the principal railway routes and afterward constructed the roads not only of this country, but of Russia and South America. Our rivers have been improved by their skill. Harbors and lighthouses built by them make the navigation of our seas and lakes secure. The public domain is divided into homesteads and the coasts are surveyed by systems devised by professors in this school. Graduates in civil life have given to the country a President, four cabinet officers, one ambassador, 14 ministers to foreign courts, 12 consuls-general, 24 senators or representatives, 16 governors of States or Territories, 77 members of State legislatures, 158 officers of State militia, 17 mayors of cities, 46 presidents of universities or colleges, 32 principals of schools, 136 professors and teachers, 87 presidents of railroad and other corporations, 63 chief engineers ditto, 62 superintendents ditto, 24 treasurers or receivers ditto, 228 civil engineers, 14 judges, 200 attorneys, 20 clergymen, 122 merchants, 230 farmers and planters, 18 bankers, 8 bank presidents, 30 editors, 179 authors, etc.

Of the 8,619 cadets who had entered the Academy, 4,121 had been graduated, 1,945 were living, 1,630 were in the army, 1,446 on the active list and 315 in civil life. The total number of graduates was 4,121. Of these 307 were promoted to the Corps of Engineers, 32 to the Topographical Engineers, 72 to the Ordnance, 49 to the Light Artillery, 1,168 to the Artillery, 1 to the Light Dragoons, 136 to the Dragoons, 648 to the Cavalry, 35 to the Mounted Rifles, 5 to the Mounted Rangers, 1,645 to the Infantry, 5 to the Rifles, 5 to the Marines, and 13 were not commissioned. Two hundred and twenty-four graduates of the Academy have been killed or mortally wounded in action since 1812.

The Academy was housed in the army barracks at West Point till 1815, when Congress appropriated $20,000 for buildings. Since that time there have been many additions. In 1910 several new buildings were completed and the old ones remodeled. In that year Major-General Thomas H. Barry succeeded Colonel Scott as superintendent.

EDWARD S. HOLDEN,
Librarian United States Military Academy.

Military Architecture. See FORTIFICATION.

Military Barracks, U. S., List of. See MILITARY POSTS, U. S.

Military Bridges. See BRIDGE.

Military Cemeteries, National, List of. See MILITARY POSTS, UNITED STATES.

Military Commission. See LAW, MILITARY.

Military Courts and Courts-Martial. Military jurisdiction is of four kinds: (a) *Military Law,* which is the legal system that regulates the government of the military establishment. It is a branch of the municipal law, and in the United States derives its existence from special constitutional grants of power; (b) *The Law of Hostile Occupation* (Military Government), being military power exercised by a belligerent by virtue of his occupation of an enemy's territory, over such territory and its inhabitants. When a conquered territory is ceded to the conqueror, military government continues until civil government is established by the new sovereign; (c) *Martial Law at Home* (or, as a domestic fact); by which is meant, military power exercised in time of war, insurrection, or rebellion, in parts of the country retaining their allegiance, and over persons and things not ordinarily subjected to it; (d) *Martial Law applied to the Army;* that is, military power extending in time of war, insurrection, or rebellion over persons in the military service, as to obligations arising out of such emergency and not falling within the domain of military law, nor otherwise regulated by law. The last two divisions are applications of the doctrine of necessity to a condition of war. They spring from the right of national self-preservation. The source of military jurisdiction is the Constitution; the *specific provisions* relating to it being found in the powers granted to Congress, in the authority vested in the President, and in a provision of the Fifth Amendment.

Military Law is derived from both written and unwritten sources. The written sources are the Articles of War, adopted as a part of the Revised Statutes of the United States in 1874 and since amended in some particulars; other statutory enactments relating to the military service; the Army Regulations; and general and special orders, and decisions promulgated by the War Department and by department, post, and other commanders. The unwritten source is the "custom of war," consisting of the customs of the service both in peace and in war.

Military Tribunals are of three kinds: (a) *Courts-Martial* (including summary courts), for the trial of offenders against military law; (b) *Courts of Inquiry,* for examining transactions of, or accusations or imputations against, officers or soldiers; (c) *Military Commissions,* for the trial of offenders against the laws of war and under martial law founded in necessity.

Courts-Martial are composed of commissioned officers only. All officers of the Regular Army, except those on the retired list and professors of the United States Military Academy, are eligible for detail for the trial of offenders belonging to the Regular Army; but no officer will be detailed for the trial of an officer superior to himself in rank when it can be avoided. Officers of the Regular Army and of the Marine Corps, detached for service with the army by order of the President, may be associated together for the trial of offenders belonging to either of these bodies. In like manner regular officers may be associated with volunteer officers for the trial of regulars or volunteers. But with these exceptions, officers of the Regular Army are not competent to sit on courts for the trial of offenders belonging to other forces. Officers of volunteers and of the militia, when the latter are called into the service of the United States, are competent to act as members of courts for the trial of regular officers or soldiers. Militia officers are also competent to sit upon courts for the trial of volunteers. But courts-martial for the trial of militia must be composed of militia officers only.

In the United States military service, the following courts-martial are authorized: (1) The "General Court-Martial"; (2) the "Summary Court"; (3) the "Garrison Court-Martial"; (4) the "Regimental Court-Martial." The General Court-Martial is the most important, the others being ordinarily called "Inferior Courts-Martial," in the order named. A General Court-Martial may consist of any number of members from 5 to 13, inclusive, and a judge-advocate; but of not less than 13 members when this number can be convened without manifest injury to the service. When, in the course of a trial, the court is reduced in number by reason of absence, challenge, or the relieving of members, it may proceed with business so long as five members remain. Whenever a General Court-Martial is reduced below the minimum, five, the remaining members should direct the judge-advocate to report the fact to the convening authority, and await further orders. In such a case, if the trial has not been entered upon, new members may be added; but if any testimony has been taken, the court should preferably be dissolved and a new one ordered.

The President is empowered to institute General Courts-Martial—1st, as Commander-in-Chief of the Army, under the Constitution; 2d, in the special contingency mentioned below; 3d, in the particular cases provided for by section 1230, Revised Statutes. Any general officer commanding an army, a territorial division, or a department, or colonel commanding a separate division, may appoint a General Court-Martial whenever necessary. But when any such commander is the accuser or prosecutor of any *officer* under his command the court must be appointed by the President. In time of war this power is extended to the commander of a tactical division or of a separate brigade; but in this case when such commander is the accuser of any person under his command the court must be appointed by the next higher commander. The superintendent of the United States Military Academy has power to convene General Courts-Martial for the trial of cadets, subject to the same limitations and conditions now existing as to other courts-martial. The officer who appoints a court-martial—general, garrison, or regimental—may dissolve it, and control its existence, but not the subject-matter of its deliberations. In the absence of special orders or legislation to that effect, personal presence within the territorial limits of his department is not essential to the validity of commands given by a department commander to be executed within such limits, such, for instance, as the appointment of a court-martial.

Courts-martial derive their existence solely from acts of Congress, and their jurisdiction is limited to the purpose of the maintenance of military discipline. Their decisions, within their jurisdiction, are not reviewable by any courts whatever. They have exclusive jurisdiction to try for acts constituting military offenses only, and also jurisdiction to try for acts which besides constituting military offenses, are civil crimes. In the latter case the military ordinarily gives precedence to the civil court, but when an officer or a soldier has been arraigned before a duly constituted court-martial for an offense triable by it, the jurisdiction thus attached can not be set aside by the process of a State court.

As regards persons, courts-martial have jurisdiction, at all times and in all places, over officers and soldiers of any troops, whether militia or others, mustered and in pay of the United States, over officers and soldiers of the marines, when detached for service with the army, over persons who fraudulently enlist in the service of the United States and receive pay or allowance thereunder, and over offenders, in general, to whom, owing to the commission of a crime, military jurisdiction has legally attached—as by an arrest or confinement—before their discharge from service. This jurisdiction over persons in the military service covers all military offenses committed by them, whether within or beyond the territorial jurisdiction of the United States. Military offenses are not territorial.

As a rule, military jurisdiction ends when a soldier is discharged. The present exceptions to this rule are, discharged officers and soldiers guilty of frauds against the United States under the 60th Article of War, and discharged officers granted trial after summary dismissal, under section 1230, Revised Statutes, and general prisoners. In time of war this jurisdiction extends to "all retainers to the camp and all persons serving with the armies of the United States in the field, though not enlisted soldiers;" to any person who "relieves the enemy with money, victuals, or ammunition, or knowingly harbors or protects an enemy;" or who "holds correspondence with, or gives intelligence to, the enemy, either directly or indirectly;" and to spies. As regards offenses, the jurisdiction embraces the offenses specifically defined in the Articles of War, or included under the general terms of the 61st and 62d Articles; the offense of military persons trading with the enemy, and that of fraudulently enlisting in the service of the United States. A court having once duly assumed jurisdiction of an offense and person, cannot, by any wrongful act of the accused, be ousted of its authority or discharged from its duty to proceed fully to try and determine, according to law and its oath. Thus the fact that, pending the trial, the accused has escaped from military custody, furnishes no ground for not proceeding to a finding, and, in the event of conviction, to a sentence, in the case; and the court may and should find and sentence as in any other case. See Articles, COURTS; HABEAS CORPUS; LAW—*General Courts-Martial;* LAW—*Garrison Courts-Martial;* LAW—*Military Arrests and Confinements;* LAW—*Military Commissions.*

EDWARD S. FARROW,
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Military Education. A system of education to merit approval must develop physical perfection, patriotism, good morals, and love of law and order; and the system best calculated to contribute to good citizenship is that which produces harmoniously and simultaneously healthy mental, physical, and moral growth. The influence of a military education is thus apparent, and it is readily seen that the value of a military education depends not so much upon the curriculum as upon the environment and routine in which the student is placed when he is most susceptible of discipline at the most impressionable period of his life.

From the moment the student enters a well-organized military school he is properly fed, clothed, and sheltered, and his welfare is transferred from his shoulders to those of instructors skilled in the art of caring and providing for him, and to his daily instruction is given such care as would be bestowed upon a delicate piece of mechanism. He is taught that cleanliness means sanitation and good health, and, by the constant association with others, regards it not as a luxury, but as an indispensable adjunct to comfort. By daily instruction, precept, and example, he is made to understand that neatness in personal appearance is the most notable element of respectability. He is quick to realize that order, induced by pride and love of judicious restraint, is superior to order inspired by fear of law. He quickly realizes the value of discipline and subjects himself to such restraint as is necessary for its proper observance. He learns to obey, and thus becomes qualified to command, acquiring and appreciating the fundamental principle underlying all law.

In the pursuit of the military feature of education, the student becomes accomplished in the school of makeshift, learns to take care of himself under all circumstances, and becomes proficient in the habit of self-restraint and familiar with natural limitations.

United States.—Washington was a firm believer in military education and advocated the necessity of establishing a military academy, and it was due to his efforts, and those of other patriots of the Revolution, that the Academy was created by Act of Congress approved 16 March 1802. The Act authorized the President to organize and establish a Corps of Engineers to consist of 5 officers and 10 cadets, and provided that it should be stationed at West Point, in the State of New York, and should constitute a Military Academy. The Academy, with 10 Cadets present, was formally opened 4 July 1802.

By various amendatory Acts of Congress, up to and including those approved 6 June 1900, 28 June 1902, and 3 March 1903, the Corps of Cadets as now constituted consists of one from each Congressional district, one from each Territory, one from the District of Columbia, one from Porto Rico, two from each State at large, and forty from the United States at large, all to be appointed by the President, and, with the exception of the 40 appointed from the United States at large, to be actual residents of the Congressional or Territorial districts, or of the District of Columbia, or of the States, respectively, from which they are appointed. Under these Acts, and under the apportionment of Members of Congress according to the 12th Census, the maximum number of Cadets is 522.

While the United States Military Academy is the foundation system of all military education in the United States, the War Department has established various Schools at Military Posts and elsewhere for instruction in theory and practice. The Artillery School at Fort Monroe; The School for Engineers at Washington Barracks; the special School for Cavalry and Infantry at Fort Riley, Kan.; the Institution for Instruction in Submarine Defense at Fort Totten, N. Y.; the Army Medical and Dental Schools at Washington; the General Service and Staff College at Leavenworth, Kan., are all active in their respective fields and are the recipients of a general supervision maintained by the Board of the War College at Washington, an institution organized to prepare officers for service on the General Staff. All officers' schools at Military Posts and the General Service and Staff College at Leavenworth are open to National Guard and Volunteer Officers, in recognition of the value of the citizen-soldier in time of war.

At the present time officers of the army are detailed as Professors of Military Science and Tactics at the following educational institutions: University of Arizona, Tuscon, Ariz.; Onachita College, Arkadelphia, Ark.; University of Arkansas, Fayetteville, Ark.; University of California, Berkeley, Cal.; Saint Matthew's Military School, San Mateo, Cal.; Mount Tamalpais Military Academy, San Rafael, Cal.; State Agricultural College of Colorado, Ft. Collins, Col.; Delaware College, Newark, Del.; University of Florida, Lake City, Fla.; Georgia Military College, Milledgeville, Ga.; North Georgia Agricultural College, Dahlonega, Ga.; Gordon Institute, Barnesville, Ga.; University of Georgia, Athens, Ga.; University of Idaho, Moscow, Idaho; University of Illinois, Champaign, Ill.; Western Military Academy, Upper Alton, Ill.; Concordia College, Fort Wayne, Ind.; Purdue University, Lafayette, Ind.; Culver Military Academy, Culver, Ind.; Simpson College, Indianola, Iowa; State University, Iowa City, Iowa; Kansas State Agricultural College, Manhattan, Kansas; Agricultural and Mechanical College of Lexington, Ky.; State University and Agricultural College, Baton Rouge, La.; College of the Immaculate Conception, New Orleans, La.; University of Maine, Orono, Maine; Saint John's College, Annapolis, Md. (1905); Maryland Agricultural College, College Park, Md.; Massachusetts Agricultural College, Amherst, Mass.; Massachusetts Institute of Technology, Boston, Mass.; Michigan Agricultural College, Lansing, Mich.; Michigan Military Academy, Orchard Lake, Mich.; College of Saint Thomas, St. Paul, Minn.; Shattuck School, Faribault, Minn. (1904-1906); University of Minnesota, Minneapolis, Minn.; Agricultural and Mechanical College, Agricultural College, Miss.; Drury College, Springfield, Mo.; Wentworth Military Academy, Lexington, Mo.; Kemper Military School, Boonville, Mo.; University of Missouri, Columbia, Mo.; University of Nebraska, Lincoln, Neb.; College of Agriculture and the Mechanic Arts, Durham, N. H.; Rutgers College, New Brunswick, N. J.; College of Agriculture and Mechanic Arts, Mesilla Park, N. M.; New Mexico Military Institute, Roswell, N. M.; Nevada State University, Reno, Nev.; College of Saint Francis Xavier, New York City, N. Y.; Saint John's Military Academy, Manlius, N. Y. (1904, 1905, 1906); New York Military Academy, Cornwall-on-Hudson, N. Y.; Cornell University, Ithaca, N. Y.; De La Salle Institute, New York City, N. Y.; Riverview Academy, Poughkeepsie, N. Y.; North Carolina College of Agriculture and Mechanic Arts, West Raleigh, N. C.; North Dakota Agricultural College, Fargo, N. D.; Miami Military Institute, Germantown, Ohio; Ohio State University, Columbus, Ohio; Ohio

Northern University, Ada, Ohio; Wilberforce University, Wilberforce, Ohio; Ohio Wesleyan University, Delaware, Ohio; University Preparatory School, Tonkawa, Okla.; Grove City College, Grove City, Penn.; Girard College, Philadelphia, Penn.; Pennsylvania Military College, Chester, Penn. (1904, 1905, 1906); Pennsylvania State College, State College, Penn.; Saint Joseph's College, Philadelphia, Penn.; Clemson Agricultural College, Clemson, S. C.; South Carolina Military Academy, Charleston, S. C. (1904, 1905); South Dakota Agricultural College, Brookings, S. D.; University of South Dakota, Vermillion, S. D.; Southwestern Baptist University, Jackson, Tenn.; University of Tennessee, Knoxville, Tenn.; University of the South, Sewanee, Tenn.; West Texas Military Academy, San Antonio, Tex.; Agricultural and Mechanical College of Texas, College Station, Tex.; Agricultural College of Utah, Logan, Utah; Norwich University, Northfield, Vt. (1904, 1905, 1906); University of Vermont, Burlington, Vt.; Virginia Military Institute, Lexington, Va.; (1904, 1905, 1906); Fork Union Academy, Fork Union, Va.; State College, Pullman, Wash.; West Virginia University, Morgantown, W. Va.; State University of Wisconsin, Madison, Wis.; Saint John's Military Academy, Delafield, Wis.; University of Wyoming, Laramie, Wyo. Seven of the foregoing institutions whose students have exhibited the greatest application and proficiency in military training and knowledge have been designated annually as «Distinguished Institutions,» the year or years in which thus designated being placed after the names of the institutions.

Military academies and instruction schools are now an indispensable part of the military systems of all great nations. Japan and China are active in their creation of new channels for the acquirement of military knowledge and are establishing schools, with courses of instruction and physical training embodying the best features of the United States Military Academy and the following European institutions.

Belgium.—The school that corresponds most nearly to the United States Military Academy is the École Militaire, or Military Academy, at Ixelles. The object of this school is to supply officers to the following arms: (1) the infantry, (2) the cavalry, (3) the artillery, and (4) the engineers. The length of the course of instruction is two years for the infantry and cavalry section, and four years for the artillery and engineer section. All students on commencing the second year's course, must contract to serve for eight years. There are no admissions to the school except by competition.

Italy.—The military schools of Italy are divided into three classes, viz.: (1) The Collego Militari established in Rome and Naples; (2) The military schools for the training of officers and non-commissioned officers, of which there are three, viz.: (a) The military school of Modena, (b) the military academy of Turin, and (c) the military sanitary school of application in Florence; (3) The «scuole militari complementari,» or the military schools of application proper, for officers, of which there are three, viz.: (a) The war school (Scuola di Guerra) in Turin; (b) the school of application of artillery and engineers, in Turin; and (c) the school of cavalry, in Pinerola. There are, in addition to the schools mentioned above, schools for artillery and musketry practice, a school of fencing, and batteries and platoons of instruction for training non-commissioned officers in their duties.

Austria.—The principal military schools in Austria are the Theresa Military Academy of Wiener-Neustadt, and the Technical Military Academy of Vienna. There are several schools, which prepare for these academies, called military «Realschulen» or technical schools. Though these schools are specially intended to prepare for the military academies, there is nothing to prevent boys from getting their preparation in other «Realschulen» or in private educational establishments. The «Realschulen» generally in Austria and Germany are intended to lay the basis for a scientific education, or what in France is called «l'enseignement moderne.» The classical schools are called «Gymnasia.»

The course at the military real schools is seven years, of which four are passed in the «Unter-Realschule,» and three years in the «Ober-Realschule.» There are four of these under technical schools, situated, respectively, at Saint Polten, Guns, Eisenstadt, and Kaschau. They have in all a capacity of about 860 scholars. The superior technical school is at Weisskirchen. It has a capacity of 450 scholars.

The military technical schools also prepare for what is called the «Cadetten-schulen» or cadet schools. The graduates of the cadet schools do not enter the army as officers, but are assigned to corps and regiments as cadets, with the actual or honorary position of non-commissioned officers. As vacancies occur they are appointed «Cadet-Officiers-Stellvertreter» (cadet officers' substitutes), in which position they exercise the functions of officers and associate with them without actually having officers' rank. After a probationary period in this position they may be nominated by the Emperor to be lieutenants of the lowest grade in their respective corps, but they must be acceptable to the officers of the unit where they have been on probation.

Armed with what is called the matura certificate, the graduate of the «Ober-Realschule» is entitled to apply for appointment to one of the military academies. In these appointments preference is given to officers' sons first, and then to the sons of officials. The standing of at least «good» is required for admission to the academies. Of the graduates with this standing about 60 per cent. are promoted to the Theresa Military Academy and about 40 per cent. to the Technical Military Academy.

England.—The schools that correspond most nearly to the United States Military Academy are the Royal Military Academy, at Woolwich, and the Royal Military College, at Sandhurst.

The Royal Military Academy is maintained for the purpose of affording a special military education for candidates for commissions in the royal artillery and royal engineers. Candidates must, in the opinion of the commander-in-chief, be in all respects suitable to hold commissions in the army. The commander-in-chief is the president of the Royal Military Academy.

An independent inspection is made annually by a board of visitors, appointed by the Secretary of State for War, and reporting to him. Such visitors are not a permanent body, but are not all changed at the same time. The report of this board is presented to Parliament.

The academy is under the control of a military officer, styled governor and commandant, appointed by and responsible to the Secretary of State for War, through the commander-in-chief. The governor is assisted by a staff officer styled the assistant commandant and secretary, who is responsible in his temporary absence for the charge of the establishment. This officer commands the cadet company, and has the custody of the records and correspondence of the academy, and gives the governor such assistance as he may require.

The Royal Military College is maintained for the purpose of affording a special military education to candidates for commissions in the infantry and cavalry. Candidates must, in the opinion of the commander-in-chief, be in all respects suitable to hold commissions in the army. The commander-in-chief is the president of the Royal Military College.

France.—The principal military schools in France are the Ecole Polytechnique, at Paris, and the Ecole Spéciale Militaire, at Saint Cyr, or Saint Cyr, as it is popularly designated.

The Polytechnic School was founded in 1794, and has been reorganized by various decrees. The object of the school is to train students for the following branches of the public service,viz.: The artillery of the army and the marine artillery; the engineer corps of the army (génie militaire); the engineer corps of the navy or naval constructors (génie maritime); the corps of naval officers; the hydrographic corps; the marine commissariat corps; the corps of highways and bridges (ponts et chaussées); the manufactories of the state; the engineers of the powder and saltpeter service; the mining engineers, and the telegraphic lines; also for such other public services as require a profound knowledge of the mathematical, physical, and chemical sciences.

Admittance to the school is exclusively by competitive examination. After a two years' course the student may go to one of the special schools of application for any of the above mentioned services, provided he can pass successfully the final examinations and be declared acceptable for this service by the decision of a committee which draws up the classification list for the public services. Fulfillment of these conditions does not give an absolute right to enter any of the public services; admission to any service depends upon the number of vacancies existing at the time of leaving the school, upon the physical aptitude of the student, and his place on the order of merit.

The special military school of Saint Cyr dates from the time of Louis XIV. It is intended to supply officers for the infantry, the cavalry, and the marine infantry. The course of instruction lasts two years, and no scholar is allowed to remain more than three years at the school. The privilege of taking a third year to complete the course is only allowed where circumstances of exceptional gravity have compelled a student to suspend work at the school.

Germany (Prussia).—The most important military school in Germany is the «Haupt-Kadetten-Anstalt,» or Upper Cadet School, at Gross-Lichterfelde. This school is supplied by the «Kadetten-hausen,» or preparatory cadet schools of Goslin (formerly at Culmer), Potsdam, Wahlstadt, Bensberg, Plon, Cranienstein, Karlsruhe and Naumburg. Beginning with the lowest class of the preparatory schools, the classes are designated as Sexta, or VI; Quinta, or V; Quarta, or IV; Unter-tertia, or U. III; Ober-tertia, or O. III; Unter-secunda, or U. II; Ober-secunda, or O. II; Unter-prima, or U. I; Ober-prima, or O. I. In addition there is an extra class called "Selecta."

The course of each of these classes lasts one year. The lower or preparatory schools contain the classes from VI up to and including upper tertia; the other classes belong to the upper cadet school. Occasionally, also, depending on the space available and the necessities of the case, some of the upper-tertia class are admitted to the upper cadet school. In the upper cadet school begins the immediate preparation for service. The classes from sexta up to and including upper prima are assimilated in the matter of instruction to the corresponding classes of the «Realschulen» of the first degree.

Saxony and Bavaria have their own cadet corps corresponding to the preparatory and upper cadet schools of Prussia, from which appointments are made to the Saxon, or Twelfth army corps and to the corps of the Bavarian army. Saxony, however, has no artillery and engineer school, and officers of those arms have to pass through the Prussian School at Berlin. Bavaria has its own artillery and engineer school at Munich.

A review of the successful men of all countries will reveal the abnormal proportion who have enjoyed military training and military experience. In the United States it is impossible to mention any important field of activity into which West Point graduates have not entered and achieved success and greatness. The characteristics of self-reliance and self-restraint, derived from military education, are the potent attributes of good citizenship and the basic principles of success, combining with mental development the military methods of physical and moral improvement. See UNITED STATES MILITARY ACADEMY and WAR COLLEGE.

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Military Engineering. See ENGINEERING; FORTIFICATION.

Military Frontier. See FRONTIER.

Military Government. See GOVERNMENT.

Military Hospitals, List of. See MILITARY POSTS, U. S.

Military Insignia of Rank. Insignia of rank is worn to-day in all armies to distinguish the various grades of officers and non-commissioned officers. It is usually in the form of epaulets, straps, braid, buttons, or chevrons, and is worn on the shoulder, sleeve, or collar of the uniform coat, according to the custom of the country to which the soldier belongs.

Military uniform did not come into existence until after the Thirty Years' War, the household troops of Louis XIV. of France being the first to wear it. Badges of rank were not in general use in the different armies until the latter part of the 18th century, although some regiments had adopted distinctive devices for this purpose long before that time.

In all armies the insignia of rank is such as is prescribed by the government, and all officers and soldiers are forbidden to wear any insignia except such as that to which their rank entitles them. The form of the insignia is always the same for officers or non-commissioned officers of the same rank, but its color sometimes differs according to the arm of the service to which the wearer belongs.

The various badges of rank worn today in the principal armies of the world are as follows:

UNITED STATES.

In the United States army there are three recognized uniforms known as full dress, dress, and service. Officers attending social functions of a military nature are permitted to wear a special full-dress uniform of a cut similar to civilian evening dress.

The full-dress coat for officers is dark blue a d double-breasted, the dress coat is dark blue and single-breasted having concealed buttons, the service coat is single-breasted and of an olive drab color. The coats of all enlisted men are single-breasted, dark blue for full dress and dress and olive drab for service. Officers wear their insignia of rank on the sleeves of their full-dress and special full-dress coats, and on the shoulders of their dress and service coats. With the dress coat the distinctive insignia forms a part of the shoulder strap, the field of which differs in color according to the arm of the service to which the wearer belongs; on the service coat the device is attached directly to the shoulder loop which is of the same material as the coat.

SLEEVE INSIGNIA.

Major-General.— Two silver stars placed above a band of gold embroidered oak leaves which encircle the cuff.

Brigadier-General.— One silver star placed as above.

Colonel.— Five strands of gold wire lace arranged in the form of a knot extending from the cuff to just below the elbow.

Lieutenant-Colonel.— Four strands.

Major.— Three strands.

Captain.— Two strands.

First Lieutenant.— One strand.

Second Lieutenant.— Without gold lace.

SHOULDER INSIGNIA.

Major-General.— Two silver stars.

Brigadier-General.— One silver star.

Colonel.— One silver eagle.

Lieutenant-Colonel.— One silver leaf.

Major.— One gold leaf.

Captain.— Two silver bars.

First Lieutenant.— One silver bar.

Second Lieutenant.— A shoulder strap with a blank field with dress uniform, no insignia with service uniform.

Officers of the United States army wear the letters «U. S.» on the collars of their dress and service coats; officers of the United States Volunteers the letters «U. S. V.»; officers of the National Guard the initial letters of their respective states.

Each branch of the service and each staff department has a distinctive color with which the uniforms of the members of that portion of the army are faced.

The following are the colors of the different facings:

Staff Corps.— Dark blue.

Engineers.— Scarlet piped with white.

Signal Corps.—Orange piped with white.

Ordnance Department.— Black piped with scarlet.

Medical Corps.— Maroon.

Quartermaster's Department.— Buff.

Cavalry.— Yellow.

Artillery.— Scarlet.

Infantry.— Light blue.

The rank of non-commissioned officers is indicated by means of chevrons, of the color of the arm of the service to which the soldier belongs, worn point upward midway between the elbow and the shoulder on the sleeves of all uniform coats.

Sergeants wear three stripes, corporals two, and lance corporals one. In addition to his stripes, a regimental sergeant-major has an arc of three bars, a battalion sergeant-major an arc of two bars, a regimental quartermaster-sergeant a tie of three bars, a battalion quartermaster-sergeant a tie of two bars, a regimental commissary-sergeant a tie of three bars and a crescent, a first sergeant a lozenge, and a company quartermaster-sergeant a tie of one bar. Non-commissioned officers of the different departments wear the distinctive devices of their departments with their chevrons.

Rank of non-commissioned officers is further indicated by the width of the trouser stripes, sergeants wearing a 1¼-inch stripe, corporals a one-half inch stripe.

To indicate service in war all enlisted men who have seen such service are entitled to wear on the sleeves of their dress coat a diagonal half chevron of white cloth, piped on each side with the facing of the arm of the service in which they earned the right to wear the chevron.

CONFEDERATE STATES.

During the Civil War the rank of officers and non-commissioned officers of the Confederate Army was indicated in the following manner, the insignia being displayed upon the uniform coat, which for officers and enlisted men was double breasted and of a cadet grey color.

Rank of officers was designated by an ornament of gold braid worn on both sleeves of the coat extending around the seam of the cuff and up the outside of the arm to the bend of the elbow. The ornament was composed of four braids for general officers, three for field officers, two for captains and one for lieutenants. Besides this sleeve decoration, the rank of officers was further shown by devices worn on the collar of the tunic as follows:

General Officers.—A wreath with three stars enclosed, embroidered in gold.

Colonel.— Three gold stars arranged horizontally.

Lieutenant Colonel.— Two gold stars.

Major.— One gold star.

Captain.— Three gold bars arranged horizontally.

First Lieutenant.— Two gold bars.

Second Lieutenant.— One gold bar.

Rank of non-commissioned officers was indicated by chevrons worn on both sleeves of the coat above the elbow, point downwards, of the color of the facing of the arm of the service to which the wearer belonged.

Sergeant-Major.— Three bars and an arc in silk.

Quartermaster-Sergeant.— Three bars and a tie in silk.

Ordnance-Sergeant.— Three bars and a star in silk.

First Sergeant.— Three bars and a lozenge in worsted.

Sergeant.— Three bars in worsted.

Corporal.— Two bars in worsted.

The coats of both the officers and of the enlisted men were piped with a facing of the color of the arm of the service to which they belonged, the facings being as follows:

General Officers, Adjutant-General's Department, Quartermaster-General's Department, Commissary-General's Department and Engineers.— Buff.

Medical Department.— Black.

Artillery.— Red.

Cavalry.— Yellow.

Infantry.— Light blue.

GREAT BRITAIN.

Insignia of rank in the British Army is worn on the shoulders by officers, and on the right sleeve of the coat by enlisted men.

The rank badges of the officers, which may be either metal or embroidery, and which are attached to the shoulder pieces of the coat, are as follows:

Field Marshal.— Crossed batons on a wreath of laurel, with a crown above.

General.— Crossed sword and baton, with star and crown above.

Lieutenant-General.— Crossed sword and baton, with crown above.

Major-General.— Crossed sword and baton, with star above.

Brigadier-General.—Crossed sword and baton.

Colonel.— Crown and two stars below.

Lieutenant-Colonel.— Crown and one star below.

Major.— Crown.

Captain.— Three stars.

Lieutenant.— Two stars.

Second Lieutenant.— One star.

Prior to May 1902, a captain wore two stars, a lieutenant one star, and a second lieutenant had no badge of rank.

Regimental officers having brevet rank wear the badges of their army rank, department officers having honorary rank the badges of that rank. Retired officers wear the letter R on their shoulder pieces directly below their badges of rank, officers of the militia the letter M.

The rank of non-commissioned officers is indicated by means of a chevron, worn point downwards, on the sleeve of the coat above the elbow. A sergeant wears three stripes of gold braid, a lance sergeant three stripes of worsted, a corporal two stripes of worsted, and a lance corporal one stripe of worsted.

GERMANY.

Insignia of rank in the German army is worn on the shoulders by officers and on the collar by non-commissioned officers.

Prior to 1808 there were no recognized badges of rank in the Prussian army, although Bavaria had already adopted them to some extent. During that year a system of rank badges was devised for the officers of the Prussian army which were worn on the shoulder pieces of the coat. During the campaign of 1813–1814 these shoulder pieces were converted into epaulets and the insignia of rank was transferred to them, and the epaulet has ever since remained the distinctive mark of the officer. The German army of today is composed of twenty-two army corps named after the different kingdoms which compose the empire. Each kingdom has some distinctive mark which is worn only by its troops; the insignia of rank however is the same throughout the army without regard to corps, or arm of service.

Except in the case of a General Field Marshal, the rank of officers is indicated by means of stars worn on the shoulder knots or epaulets.

Officers below the grade of major wear shoulder knots, all other officers epaulets. Shoulder knots are formed of half moon shaped pieces of gold or silver embroidery (according to the regiment) enclosing a cloth field of the color of the army corps to which the regiment belongs. On the field is displayed the regimental number and the insignia of rank. Epaulets for officers below the grade of major general are of the same design as that of the shoulder knot with the addition of gold or silver fringe, according to the embroidery of the knot.

The epaulets of general officers are of silver bullion.

Insignia of rank for officers is as follows:

General Field Marshal.— Two gold crossed batons.

Colonel-General.— Three gold stars.

General of Infantry or Cavalry.— Two gold stars.

Lieutenant-General.— One gold star.

Major-General.— Blank epaulet.

Colonel.— Two gold stars.

Lieutenant-Colonel.— One gold star.

Major.— Blank field.

Captain.— Two gold stars.

First Lieutenant.— One gold star.

Second Lieutenant.— Blank field.

Non-commissioned officers wear the insignia of their rank on the standing collar of their coat, the different grades being distinguished in the following manner:

Lance Corporal.— Two small buttons of gold or silver (according to regiment) worn, one on each side of the collar directly above the shoulder.

Corporal.— A stripe of gold or silver lace extending around the top of the collar.

Sergeant.— The same collar stripe as that of a corporal with the addition of two large buttons worn on either side of the collar in the same manner as the buttons of a lance corporal.

FRANCE.

In the French Army, insignia of rank is worn on the sleeves of the uniform coat by both officers and enlisted men. For officers it consists of stripes of gold or silver braid, according to the arm of the service, worn either straight across the sleeve directly above the cuff, or arranged in the form of a loop extending from the cuff to a point midway between the elbow and the shoulder. For enlisted men it consists of stripes of red or yellow cloth, or gold or silver braid, worn diagonally across the sleeve of the coat above the cuff.

Officers of infantry, engineers, spahis, and of the Garde Republican wear straight gold stripes; officers of cuirassiers, dragoons, chasseurs a cheval, hussars, chasseurs d' Afrique zephirs, and of the gendarmie, straight silver stripes; officers of zouaves, turcos, and artillery, looped gold stripes.

Corporals of infantry, zouaves, cuirassiers, dragoons, chasseurs a cheval, hussars, artillery, and engineers wear red stripes; corporals of turcos, chasseurs a pied, zephirs, chasseurs d' Afriqne, and spahis, yellow stripes.

The distinctive insignia of the various grades is as follows:

General of Division.— Six stripes of black mohair braid arranged in the form of a pointed loop, and three silver stars.

General of Brigade.— Six stripes of black mohair braid arranged as for a general of division, and two silver stars.

Colonel.—Five stripes of gold or silver braid.

Lieutenant-Colonel.— Three stripes of gold and two of silver, or three of silver and two of gold.

Major.— Four gold or silver stripes.

Captain.— Three gold or silver stripes.

Lieutenant.— Two gold or silver stripes.

Sous Lieutenant.— One gold or silver stripe.

Sergeant-Major.—Two gold or silver stripes.

Sergeant.— One gold or silver stripe.

Corporal.— Two red or yellow stripes.

Adjutants rank between officers and non-commissioned officers, a grade corresponding to that of a warrant officer of the United States Navy. They wear practically the same uniform as that of a sous lieutenant, but their stripe is of the opposite color from that of the officers of their regiment.

Insignia of rank is also worn on the cap by officers, the cap being braided to conform with the sleeve decoration. When in full dress, officers wear epaulettes of gold or silver according to the arm of the service to which they belong.

AUSTRIA-HUNGARY.

In the Austrian Army, the insignia of rank is worn on the standing collar of the coat by both officers and enlisted men. Officers below the grade of major, and all non-commissioned officers wear the badges of their rank upon a field of cloth, of the color of their regimental facing, extending from the front of the collar to the line of the shoulder piece; all other officers wear their badges of rank upon a field of gold.

The following is the distinctive insignia of the different grades:

Commander-in-Chief.— Gold collar embroidered with oak leaves.

Marshal.— Three gold stars.

Field Marshal.— Two gold stars.

Major-General.— One gold star.

Colonel.— Three silver stars.

Lieutenant-Colonel.— Two silver stars.

Major.— One silver star.

Captain.— Three gold stars.

First Lieutenant.— Two gold stars.

Second Lieutenant.— One gold star.

Sergeant.— Three metal stars, and a yellow stripe extending around the front and lower side of the collar field.

Lance Sergeant.— Three metal stars.

Corporal.— Two metal stars.

Lance Corporal.— One metal star.

ITALY.

In the Italian Army the insignia of rank, except in the case of general officers, is worn on the sleeve of the coat. The design, which is that of a loop, extends from the cuff to the elbow.

General officers wear one, two, or three stars according to rank. Sleeve insignia is as follows:

Colonel.— One wide, and three narrow stripes of gold braid.

Lieutenant-Colonel.— One wide, and two narrow stripes of gold braid.

Major.— One wide, and one narrow stripe of gold braid.

Captain.— Three narrow stripes of gold braid.

First Lieutenant.— Two narrow stripes of gold braid.

Second Lieutenant.— One narrow stripe of gold braid.

Sergeant.— One red stripe with one gold stripe underneath.

Corporal.— One red stripe.

SPAIN.

The insignia of rank in the Spanish Army is worn on the cuff of the coat by both officers and enlisted men. It consists of a form of braiding, technically known as galones, of gold, silver, or cloth, which extends across the top and down the back of the cuff. These galones vary in width according to rank and are of gold in some regiments and of silver in others. Stars of either gold or silver, to match the galones, are worn by all officers below the grade of brigadier-general.

The distinctive insignia of the various grades is as follows:

Captain-General.— Three stripes of twisted gold braid.

Lieutenant-General.— Two stripes of twisted gold braid.

Major-General.— One stripe of twisted gold braid.

Brigadier-General.— One stripe of twisted silver braid.

Colonel.— Three stripes of gold or silver braid (according to regiment) of five threads each, and three eight-pointed stars, of gold or silver, worn below the galones.

Lieutenant-Colonel.— Two stripes and two stars like those of a colonel.

Major.— One gold and one silver stripe, and one gold and one silver star worn below the galones.

Captain.—Three stripes of gold or silver braid, and three stars to match, worn above the galones.

Lieutenant.— Two stripes and two stars like those of a captain.

Ensign.— One stripe and one star like those of a captain.

Staff-Sergeants.— One stripe like that of an ensign.

First Sergeant.— Three narrow gold or silver stripes.

Sergeant.— Two stripes like those of a first sergeant.

Corporal.— Three stripes of scarlet cloth.

Lance Corporal.— Two stripes of scarlet cloth.

RUSSIA.

Russian Army officers wear their insignia of rank on their shoulders, the distinctive badges being displayed upon shoulder straps extending from the sleeve to the collar, when in undress and service uniform, and on shoulder knots and epaulets when in full dress. The following are the designs of the different shoulder straps and the badges of rank worn with them.

For general officers a strap of zig-zag pattern.

General.— No badge.
Lieutenant-General.— Three stars.
Major-General.— Two stars.

For field officers, and staff officers of the same rank, a strap containing two stripes.

Colonel.— No badge.
Lieutenant-Colonel.— Three stars.

For line officers, and staff officers of the same rank, a strap containing one stripe.

Captain.— No badge.
Second Captain.— Four stars.
First Lieutenant.— Three stars.
Second Lieutenant.— Two stars.

The Hussars of the Guard have a special form of shoulder strap but the insignia displayed thereon is the same as that worn by the rest of the army.

In addition to the stars, the shoulder straps bear likewise the numbers or letters designating the unit to which the officer belongs. The different colors of the straps denote the various arms of the service.

JAPAN.

The Japanese wear the insignia of their military rank on their sleeves, the design, which is in the form of a pointed loop of braid, extending from the cuff to a point midway between the elbow and the shoulder. The number of stripes which compose the loop indicate the different grades of rank.

For all officers except those of the Pay, and the Medical Corps, the stripes are of gold, for the officers of the Pay Corps they are of silver, and for the officers of the Medical Corps of alternate silver and gold. General officers wear their stripes above a band of gold, all other officers wear them above a pointed cuff of the color of the arm of the service to which they belong.

The colors which denote the various arms of the service are, scarlet for infantry, green for cavalry, yellow for artillery, and dark red for engineers.

The sleeve insignia of officers is as follows:

Marshal.— Seven stripes.
General.— Same as marshal.
Lieutenant-General.— Six stripes.
Major-General.— Five stripes.
Colonel.— Six stripes.
Lieutenant-Colonel.— Five stripes.
Major.— Four stripes.
Captain.— Three stripes.
First Lieutenant.— Two stripes.
Second Lieutenant.— One stripe.

The rank of non-commissioned officers is indicated by means of stripes of the color of the arm of the service to which the wearer belongs, worn in the form of a band around the cuff.

First Sergeant.— Three stripes.
Sergeant.— Two stripes.
Corporal.— One stripe.

CHINA.

The rank of officers of the Chinese Army is indicated by embroidered badges representing animals, worn upon the breast of the military tunic, the distinctive badges of the different grades being as follows:

Commander-in-Chief.— Unicorn.
Lieutenant-General.— Lion.
Major-General.— Lion.
Colonel.— Leopard.
Lieutenant-Colonel.— Leopard.
Major.— Tiger.
Captain.— Bear.
Lieutenant.— Panther.
Ensign.— Panther.

Wives of Chinese officers are entitled to wear the badges of their husband's rank.

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Military Law. See LAW, MILITARY.

Military Masts, in naval architecture, masts on a modern fighting ship, provided purely for military purposes. They are of steel, and hollow, and through them access is had to the conning tower on the superstructure of the deck where are the wheel, the wires communicating to all parts of the ship, and where the captain generally takes his stand; to the fighting-top with its rapid-fire guns; and to the look-out far above all of these.

Military Music. See BAND; MUSIC.

Military Occupation, Law of. See LAW, MILITARY.

Military Order of Foreign Wars. See FOREIGN WARS, MILITARY ORDER OF.

Military Orders. See ORDERS, ROYAL.

Military Police, in the United States army police duty is required of the provost guard; in the British army it consists of mounted and unmounted branches of the regular army service; in France police duty is performed by the gendarmes (q.v.); in Canada, the Northwest mounted police do patrol duty, and there are similar bodies in Australia. In South Africa, the Cape mounted police are available for military duty, and there are similar forces in most of the African colonies.

Military Posts, United States. Upward of 5,000 forts, camps, redoubts, reservations, etc., have been established or erected in the United States since the early colonial period. A great many of these military posts were the result of the Civil War and but few of them have since been maintained. The list of forts, barracks, arsenals, national cemeteries, etc., occupied by troops in 1902, and under control of the War Department, was as follows:

Adams, Fort, R. I.—On Brenton's Point, near Newport.
Alcatraz Island, Fortifications on, Cal.—San Francisco Harbor.
Alexandria National Cemetery, La.—At Pineville.
Alexandria National Cemetery, Va.—At Alexandria.
Allegheny Arsenal, Pa.—At Pittsburg.
Andersonville National Cemetery, Ga.—At Andersonville.
Andrew, Fort, Mass.—At Gurnet Point, near Plymouth.
Andrews, Fort, Mass.—On Peddock's Island.
Angel Island, Fort on, Cal.—Now Fort McDowe
Annapolis National Cemetery, Md.—At Annapolis.
Antietam National Cemetery, Md.—At Sharpsburg.
Apache, Fort, Ariz.—On White Mountain River.
Arlington National Cemetery, Va —Opposite Washington, D. C.
Armistead, Fort, Md.—At Hawkin's Point, Patapsco River.
Army and Navy General Hospital, Ark.—At Hot Springs.
Assinniboine, Fort, Mont.—On Beaver Creek, Choteau County.

MILITARY POSTS

Bagley Battery, N. C.—At Fort Caswell.
Baker, Fort, Cal.—At Lime Point, San Francisco Harbor.
Ball's Bluff National Cemetery, Va.—On Potomac River.
Banks, Fort, Mass.—At Grover's Cliff, near Boston.
Barnes General Hospital, D. C.—At Soldiers' Home.
Barrancas, Fort, Fla.—Near Pensacola.
Barrancas National Cemetery, Fla.—North Side of Pensacola Bay.
Baton Rouge National Cemetery, La.—At Baton Rouge.
Battle Ground National Cemetery, D. C.—Near Soldiers' Home.
Bayard, Fort, N. Mex.—At Pinos Altos, Grant County.
Beaufort National Cemetery, S. C.—At Beaufort.
Bellevue Rifle Range, Neb.—On Missouri River.
Benicia Arsenal, Cal.—At Benicia.
Benicia Barracks, Cal.—At Benicia.
Berry Battery, Me.—On Great Diamond Island.
Beverly National Cemetery, N. J.—At Beverly.
Bliss, Fort, Tex.—At El Paso.
Boise, Fort or Barracks, Idaho.—At Boise City.
Bowdoin Battery, Me.—On Cushing's Island.
Bowyer Battery, Ala.—At Fort Morgan.
Brady, Fort, Mich.—At Sault Ste. Marie.
Brown, Fort, Tex.—At Brownsville.
Brownsville National Cemetery, Tex.—At Brownsville.
Brumby Battery, Ga.—At Fort Screven.
Butler, Camp, National Cemetery, Ill.—At Springfield.
Canby, Fort, Wash.—On Cape Disappointment.
Capron Battery, S. C.—At Sullivan's Island.
Carlisle Barracks, Pa.—At Carlisle.
Carroll, Fort, Md.—At Seller's Point Flats, Patapsco River.
Casey, Fort, Wash.—Near Port Townsend.
Caswell, Fort, N. C.—On Oak Island, Cape Fear River.
Caswell Battery, S. C.—At Fort Caswell.
Cave Hill National Cemetery, Ky.—At Louisville.
Central Branch National Military Home, Ohio.—Montgomery County.
Chalmette National Cemetery, La.—Near New Orleans.
Chattanooga National Cemetery, Tenn.—At Chattanooga.
City Point National Cemetery, Va.—At City Point.
Clark Battery, Ore.—At Fort Stevens.
Clark, Fort, Tex.—Near Brackettville.
Clinch (1), Fort, Fla.—On Amelia Island, at Fernandina.
Cold Harbor National Cemetery, Va.—In Hanover County.
Columbia, Fort, Wash.—At Chinook Point.
Columbus, Fort, N. Y.—On Governor's Island.
Columbus Barracks, Ohio.—At Columbus.
Constitution, Fort, N. H.—Near Portsmouth.
Corinth National Cemetery, Miss.—At Corinth.
Crook, Fort, Neb.—Sarpy County, 10 miles from Omaha.
Crown Hill National Cemetery, Ind.—At Jeffersonville.
Collum, Battery, Fla.—At Fort Pickens.
Culpeper National Cemetery, Va.—At Culpeper.
Custer Battlefield National Cemetery, Mont.—At Crow Agency.
Cypress Hills National Cemetery, N. Y.—At Brooklyn.
Dade (new), Fort, Fla.—On Egmont Key.
Danville Branch National Home, Ill.—At Danville.
Danville National Cemetery, Ky.—At Danville.
D. A. Russell, Fort, Wyo.—Near Cheyenne.
David's Island Depot, etc., N. Y.—Now Fort Slocum.
Davis, Fort, Alaska.—At Nome City.
Dearborn Battery, Ala.—At Fort Morgan.
Decatur Battery, Md.—At Fort Washington.
Delaware, Fort, Del.—On Pea Patch Island.
De Leon Battery, Fla.—At Key West.
De Soto, Fort, Fla.—On Mullet Key.
Donelson, Fort, National Cemetery, Tenn.—At Dover.
Discharge, Camp, Cal.—On Angel Island.
Doubleday Battery, N. Y.—At Fort Hamilton.
Douglas, Fort, Utah.—3 miles east of Salt Lake City.
Douglas, Camp, Wis.—In Juneau County.
Dover, U. S. Powder Depot at N. J.—At Dover.
Duane Battery, N. Y.—At Fort Wadsworth.
Du Chesne, Fort, Utah.—In Uintah County.
Du Pont, Fort, Del.—At Delaware City.
Eastern Branch National Home, Me.—At Togus.
Egbert, Fort, Alaska.—At Eagle City.
Emory Battery, Md.—At Fort Washington.
Ethan Allen, Fort, Vt.—5 miles from Burlington.
Fayetteville National Cemetery, Ark.—At Fayetteville.
Finns Point National Cemetery, N. J.—Near Salem.
Flagler Battery, N. C.—Near Fort Macon.
Flagler, Fort, Wash.—Marrowstone Point, Puget Sound.
Florence National Cemetery, S. C.—At Florence.
Foote, Fort, Md.—At Rosier's Bluff.
Foster, Fort, Me.—On Gerrish Island.
Fredericksburg National Cemetery, Va.—At Fredericksburg.
Fremont, Fort, S. C.—On St. Helena Island.
Gaines, Fort, Ala.—On Dauphin Island, Mobile Bay.
Gettysburg National Cemetery, Pa.—At Gettysburg.
Gibbon, Fort, Alaska.—At the mouth of Tanana River.
Gillmore Battery, N. Y.—At Fort Hamilton.
Glendale National Cemetery, Va.—At Glendale.
Gorges, Fort, Me.—On Hog Island Ledge, Portland Harbor.
Grafton National Cemetery, W. Va.—At Grafton.
Granger Battery, N. J.—At Fort Hancock.
Grant, Fort (new), Ariz.—At foot of Mt. Graham.
Gratiot, Fort, Mich.—On St. Clair River, near Port Huron.
Great Diamond Island, Batteries on, Me.—Portland Harbor.
Greble, Fort, R. I.—On Dutch Island, near Newport.
Greene Battery, R. I.—At Fort Adams.
Gregg Battery, N. J.—At Fort Mott.
Griswold, Fort, Conn.—At New London.
Hale, Fort, Conn.—New Haven Harbor.
Hale Battery, R. I.—At Fort Greble.
Hamilton, Fort, N. Y.—New York Harbor.
Hampton National Cemetery, Va.—At Hampton.
Hancock, Fort, N. J.—At Sandy Hook.
Harrison, Fort, Mont.—4 miles from Helena.
Harrison, Fort, National Cemetery, Va.—At Varinagrove.
Heath, Fort, Mass.—Near Winthrop.
Honeycutt Battery, Me.—On Great Diamond Island.
Hot Springs Reservation, Ark.—In Garland County.
Houston, Sam, Fort, Tex.—At San Antonio.
Howard, Fort, Md.—At North Point, Patapsco River.
Huachuca, Fort, Ariz.—In Cochise County.
Humphreys Battery, Md.—At Fort Washington.
Hunt, Fort, Va.—On the Potomac River.
Independence, Fort, Mass.—On Castle Island, Boston.
Indianapolis Arsenal, Ind.—At Indianapolis.
Jackson Barracks, La.—Near New Orleans.
Jackson, Fort, La.—Mississippi River.
Jasper Battery, S. C.—At Sullivan's Island.
Jefferson Barracks, Mo.—9 miles below St. Louis.
Jefferson Barracks National Cemetery. Mo.—At Jefferson Barracks.
Jefferson City National Cemetery, Mo.—At Jefferson City.
Jeffersonville Quartermaster Depot, Ind.—At Jeffersonville.
Johnston, Fort, N. C.—Near Southport.
Kendrick Battery, Me.—On Cushing Island.
Kennebec Arsenal, Me.—At Augusta.
Keogh, Fort, Mont.—In Custer County.
Keokuk National Cemetery, Iowa.—At Keokuk.
Key West Barracks, Fla.—At Key West.
King Battery, N. Y.—At Fort Totten.
Knox, Fort, Me.—At Bucksport.
Knoxville National Cemetery, Tenn.—At Knoxville.
Krayenbuhl Battery, N. Y.—At Fort Mott.
Lafayette, Fort, N. Y.—In New York Harbor.
Lawton, Fort, Wash.—At Magnolia Bluff.
Leavenworth, Fort, Kan.—3 miles from Leavenworth.
Leavenworth Military Prison, Kan.—At Fort Leavenworth.
Leavenworth, Fort, National Cemetery, Kan.—At Fort Leavenworth.
Lebanon National Cemetery, Ky.—At Lebanon.
Levett, Fort, Me.—On Cushing's Island.
Lewis Battery, Ore.—At Fort Stevens.
Lexington National Cemetery, Ky.—At Lexington.
Lincoln, Fort, N. Dak.—near Bismarck.
Liscum, Fort, Alaska.—At Port Valdez.
Little Rock National Cemetery, Ark.—At Little Rock.
Livingston, Fort, La.—On Grand Terre Island.
Logan, Fort, Colo.—10 miles from Denver.
Logan H. Roots, Fort, Ark.—Near Little Rock.
Loudon Park National Cemetery, Md.—At Baltimore.
McClary, Fort, Me.—On Kittery Point.
McDowell, Fort, Cal.—On Angel Island.
McHenry, Fort, Md.—At Baltimore.
McIntosh, Fort, Tex.—On Rio Grande, near Laredo.
Mackenzie, Fort, Wyo.—Near Sheridan.
Mackinac, Fort, Mich.—On Mackinac Island.
Macomb, Fort, La.—At Chef Menteur Pass.
Macon, Fort, N. C.—On Bogne Island.
McPherson, Fort and Barracks, Ga.—At Atlanta.
McPherson, Fort, National Cemetery, Neb.—At Maxwell.
McRee, Fort, Fla.—Pensacola Bay.
Madison Barracks, N. Y.—At Sackett Harbor.
Mansfield, Fort, R. I.—Matatree Point, near Watch Hill.
Marietta National Cemetery, Ga.—Near Marietta.

Marion, Fort, Fla.—At St. Augustine.
Marion Branch National Military Home, Ind.—Grant County.
Mason, Fort, Cal.—Black Point, San Francisco.
Meade, Fort, S. Dak.—On Bear Butte Creek.
Meigs Battery, Md.—At Fort Washington.
Memphis National Cemetery, Tenn.—At Memphis.
Mexico City National Cemetery, Mexico.—City of Mexico.
Michie, Fort, N. Y.—Near New London, Conn.
Mifflin, Fort, Pa.—On Mud Island, Delaware River.
Miley, Fort, Cal.—Point Lebos, San Francisco Harbor.
Mill Springs National Cemetery, Ky.—At Mill Springs.
Missoula, Fort, Mont.—On Bitter Root River.
Mobile National Cemetery, Ala.—Near Mobile.
Monroe, Fort, Va.—At Old Point Comfort.
Montgomery, Fort, N. Y.—At Rouse's Point.
Morgan, Fort, Ala.—At Mobile Point.
Mott, Fort, N. J.—At Finn's Point.
Moultrie, Fort, S. C.—Charleston Harbor.
Mound City National Cemetery, Ill.—At Mound City.
Myer, Fort, Va.—At Arlington.
Nashville National Cemetery, Tenn.—At Nashville.
Natchez National Cemetery, Miss.—At Natchez.
New Albany National Cemetery, Ind.—At New Albany.
Newbern National Cemetery, N. C.—At Newbern.
Newton, Fort, N. Y.—On Staten Island.
New York Arsenal, N. Y.—On Governor's Island.
Niagara, Fort, N. Y.—At the mouth of the Niagara River.
Niobrara, Fort, Neb.—In Cherry County.
Northwestern Branch National Home, Wis.—Milwaukee County.
Oglethorpe, Fort, Ga.—At Savannah.
Ontario, Fort, N. Y.—At Oswego.
Osceola Battery, Fla.—At Key West.
Pacific Branch Soldiers' Home, Cal.—At Santa Monica.
Paddock's Island, Fort on, Mass.—Fort Andrews.
Pensacola Battery, Fla.—Santa Rosa Island.
Philadelphia National Cemetery, Pa.—At Philadelphia.
Phœnix, Fort, Mass.—New Bedford Harbor.
Pickens, Fort, Fla.—Santa Rosa Island.
Plattsburg Barracks, N. Y.—At Plattsburg.
Popham, Fort, Me.—Mouth of Kennebec River.
Poplar Grove National Cemetery, Va.—Near Petersburg.
Porter, Fort, N. Y.—At Buffalo.
Port Hudson National Cemetery, La.—At Port Hudson.
Portland Head, Fort at, Me.—Fort Williams.
Preble, Fort, Me.—In Portland Harbor.
Presidio of San Francisco, Cal.—At San Francisco.
Pulaski, Fort, Ga.—Savannah Harbor.
Quincy National Cemetery, Ill.—At Quincy.
Raleigh National Cemetery, N. C.—At Raleigh.
Rampart, Camp, Alaska.—At Rampart City.
Reno, Fort, Okla.—On Canadian River.
Revere, Fort, Mass.—At Hull.
Richmond Battery, N. Y.—At Fort Wadsworth.
Richmond National Cemetery, Va.—At Richmond.
Riley, Fort, Kan.—Near Junction City.
Ringgold, Fort, Tex.—Near Rio Grande City.
Robinson, Fort, Neb.—At Red Cloud Agency.
Rock Island National Cemetery, Ill.—At Rock Island.
Rock Island Armory and Arsenal, Ill.—On Rock Island.
Rodman, Fort, Mass.—Near New Bedford.
Rosecrans, Fort, Cal.—At San Diego.
Russell, D. A., Fort, Wyo.—3 miles from Cheyenne.
St. Augustine National Cemetery, Fla.—At St. Augustine.
St. Francis Barracks, Fla.—At St. Augustine.
St. Louis Powder Depot, Mo.—At Jefferson Barracks.
St Louis Clothing Depot, Mo.—At St. Louis.
St. Michael, Fort, Alaska.—On St. Michael's Island.
St Philip, Fort, Ala.—Mobile River.
St. Philip, Fort, La.—Mississippi River.
Salisbury National Cemetery, N. C.—At Salisbury.
Sam Houston, Fort, Tex.—At San Antonio.
San Antonio Arsenal, Tex.—At San Antonio.
San Antonio National Cemetery, Tex.—San Antonio.
San Diego Barracks, Cal.—At San Diego.
San Francisco National Cemetery, Cal.—At the Presidio.
San Jacinto, Fort, Tex.—Near Galveston.
Santa Fé National Cemetery, N. M.—At Santa Fé.
Scammel, Fort, Me.—Portland Harbor.
Schuyler, Fort, N. Y.—At Throg's Neck.
Scott, Fort, National Cemetery, Kan.—In Bourbon County.
Screven, Fort, Ga.—On Tybee Island.
Sedgwick Battery, R. I.—At Fort Greble.
Seminole Battery, Fla.—At Key West.
Seven Pines National Cemetery, Va.—In Henrico County.
Sewall, Fort, Mass.—At Marblehead.
Sheridan, Fort, Ill.—Near Highwood.
Shiloh National Cemetery, Tenn.—At Pittsburg Landing.
Ship Island, Fort on, Miss.—12 miles from Biloxi.
Shipp Battery, N. C.—At Fort Caswell.
Sill, Fort, Okla.—At Medicine Bluff.
Skagway, Alaska.—Near Dyea.
Slocum, Fort, N. Y.—Near New Rochelle.
Smallwood, Fort, Md.—At Rock Point.
Smith, Fort, National Cemetery, Ark.—On Arkansas River.
Snelling, Fort, Minn.—Near St. Paul.
Soldiers' Home National Cemetery, D. C.—At Soldiers' Home.
Southern Branch National Soldiers' Home, Va.—Elizabeth City County.
Springfield Armory, Mass.—At Springfield.
Springfield National Cemetery, Mo.—At Springfield.
Standish, Fort, Mass.—On Lowell's Island.
Stark, Fort, N. H.—Portsmouth Harbor.
Staunton National Cemetery, Va.—At Staunton.
Stevens, Fort, Ore.—Mouth of Columbia River.
Stone River National Cemetery, Tenn.—At Murfreesboro.
Strong, Fort, Mass.—At Long Island Head.
Sullivan's Island, Batteries at, S. C.—Charleston Harbor.
Sumter, Fort, S. C.—Charleston Harbor.
Swift, Battery, N. C.—At Fort Caswell.
Taylor, Fort, Fla.—At Key West.
Terry, Fort, N. Y.—On Plumb Island.
Thomas, Fort, Ky.—3 miles from Newport.
Thompson Battery, Me.—Portland Harbor.
Tompkins, Fort, N. Y.—Staten Island.
Totten, Fort, N. Y.—At Willett's Point.
Townsend, Fort, Wash.—Near Port Townsend.
Travis, Fort, Tex.—At Bolivar Point.
Trumbull, Fort, Conn.—At New London.
United States Powder Depot, N. J.—Near Dover.
Vancouver, Fort or Barracks, Wash.—At Vancouver.
Vicksburg National Cemetery, Miss.—At Vicksburg.
Wadsworth, Fort, N. Y.—On Staten Island.
Walla Walla, Fort, Wash.—At Walla Walla.
Warren, Fort, Mass.—Boston Harbor.
Washakie, Fort, Wyo.—On Shoshone Indian Reservation.
Washington, Fort, Md.—On Potomac River.
Watertown Arsenal, Mass.—At Watertown.
Watervliet Arsenal, N. Y.—At West Troy.
Wayne, Fort, Mich.—At Detroit.
Western Branch National Military Home, Kan.—Leavenworth County.
West Point, Military Academy at, N. Y.—West Point.
Wetherill, Fort, R. I.—Narragansett Bay.
Weymouth Battery, Me.—Portland Harbor.
Whipple, Fort or Barracks, Ariz.—At Prescott.
Williams, Castle, N. Y.—On Governor's Island.
Williams, Fort, Me.—At Portland Head.
Wilmington National Cemetery, N. C.—At Winchester.
Winchester National Cemetery, Va.
Winfield Scott, Fort, Cal.—At the Presidio, San Francisco.
Wingate, Fort, N. Mex.—On the Rio Puerco.
Winthrop, Theodore, Battery, Mass.—At Grover's Cliff.
Wood, Fort, N. Y.—On Bedloe's Island.
Woodlawn National Cemetery, N. Y.—At Elmira.
Wool, Fort, Va.—Near Fort Monroe.
Worden, Fort, Wash.—Near Port Townsend.
Worth Battery, Fla.—At Fort Pickens.
Wright, Fort, Wash.—Near Spokane.
Wright, H. G., Fort, N. Y.—On Fisher's Island.
Yates, Fort, N. Dak.—At Standing Rock Indian Agency.
Yellowstone, Fort, Wyo.—In Yellowstone Park.
Yorktown National Cemetery, Va.—At Yorktown.

Military Prisons, in the United States, penitentiaries or prisons set apart for military convicts. Long term prisoners are sent usually to the military prison at Fort Leavenworth, Kan., or on Alcatraz Island in San Francisco Bay. For small offenses prisoners are confined in the smaller prisons connected with forts and barracks. Most of the prisoners in the Department of the East are confined at Governor's Island, N. Y.

Military Punishments. See LAW, MILITARY.

Military Reservations, United States, a general term applied to all military posts set aside for military occupation. In most instances large tracts of land surrounding military forts, schools, barracks, etc., are purchased by the government and improved and adorned; buildings, constructed thereon for officers' residences, parade grounds established and works of defense erected. The Presidio reservation in San Francisco is one of the largest in this country. See MILITARY POSTS, UNITED STATES.

Military Rule. See LAW, MILITARY.

Military Schools, are institutions where soldiers or young men are given a military education. Of the former class, the «soldier schools» of Prussia, established in every regiment or battalion, in which the privates are taught the common rudimentary branches, and sometimes singing also, are the most remarkable. There are similar schools in the Austrian, British, and other European armies. Academies of the second class, intended to educate officers, were not unknown in antiquity, and are now an indispensable part of the military system of all great nations. The first military school in France was established by Louis XV. at Vincennes in 1751; it had 500 pupils, all of whom were young noblemen. The famous school of Saint Cyr was founded by Bonaparte in 1803, and still retains the principal features of its first organization. Even before the Seven Years' war the French had an artillery school in every town where a regiment of that arm was garrisoned. In Germany the education of officers is provided for by high schools for each arm in every army division, and by the royal military school at Berlin, founded by Frederick the Great, to which the most deserving young officers are admitted from the line. In Great Britain the royal military college at Sandhurst, which comprises a cadet's college and a staff college, and the royal military academy at Woolwich, designed as an artillery and engineer school, enjoy a high reputation. A military college was also established by the East India Company at Addiscombe for the education of cadets for their own army. The United States military academy at West Point, founded in 1802, ranks second to no institution of the kind in the world. See MILITARY ACADEMY, UNITED STATES.

Military Science, Development of. From a military point of view, the 19th century divides itself naturally into certain well-marked periods. We have first the great era of the Napoleonic wars, closed by the battle of Waterloo. This is followed by long years of peace, broken at last by the Crimean war. The next period to come under notice is that of our own Civil War, in which, in reality, modern conditions of warfare may be said to have taken their rise. The use of independent cavalry, the proper organization of field artillery, the intrenched battlefield, the influence of railways, to say nothing of other particulars now regarded as essential by all military nations, find their first formal expression, if not always their full development, in this great struggle. Recrossing the Atlantic, the next term in the military progress of the century is found in the rise of Prussia, through the defeat of Austria in 1866, as a Power of the first rank, a position confirmed four years later by its complete overthrow of France. Since that epoch, military development, where fostered, has consisted almost wholly in an imitation, more or less close, of the German system of organization. These last years are marked, moreover, by a hitherto unparalleled application of the arts and sciences to the improvement of the material of war.

It is clear, then, that the growth of the military art during the 19th century has in no wise been a direct function of the time. In some of its most notable aspects the art has developed more rapidly during the past 40 years than it had in the preceding 100. So conspicuously is this true that we may not assert that its state at the opening of the century was even a transition state. In all countries, with the exception of France, the conditions of the 18th had overflowed almost unchanged into the 19th century. The era was that of the great Frederick. His example still bore undisputed sway to such a degree, indeed, that the husk was mistaken for the kernel, the appearance substituted for the reality. The armies of the day were in all essentials hired armies, the soldiers mercenaries, in the sense that war was largely a trade. Organization, recruiting, mobilization, administration, supply, transportation — all these, the life-blood of a modern army, were, if not unknown, at least not understood as they are to-day. They had not as yet been generalized into a continuing system applicable to a state either of peace or of war.

Similarly of arms and of equipment: the flint-lock musket, found in the hands of the troops of all armies, had been for many years substantially a constant quantity, while gunpowder, the only explosive and propelling agent employed, had an unbroken ancestry of centuries of continuous use. The great objective in the training of men, France again possibly excepted, lay in the development of a machine-like precision of drill, and this rigidity was carried so far as to convert maneuvering, even under fire, into a sort of geometrical exercise. On the field, deep columns and serried ranks were the rule. Infantry opened fire at two hundred yards with uncertain, if not innocuous, results at superior ranges. Naturally, under these conditions, cavalry could and did intervene directly in the decision of affairs on the battlefield. The range of field artillery was limited, and, until Napoleon's appearance, its powers and possibilities were not, on the whole, well understood.

The picture changes when we turn to the end of the 19th entury. The army is now the «nation in arms» — that is, war is no longer a trade, but a duty, and preparation for war a personal obligation to the state. Upon a declaration of hostilities, at the present day, the effort is made to bring the full strength of the nation to bear, or in other words, mobilization takes place. But this implies a full degree of preparedness, and preparedness, in its turn, a thorough study and application of the principles of organization and training, of supply and administration. Here we touch upon a well-defined characteristic of final as contrasted with initial conditions; preparation for war goes on unceasingly, in times of the profoundest peace, although no possible cause for war can be discerned in any direction. On the material side, the transformation is equally complete. All the possible resources of modern science have been levied on to contribute their share not only toward the improvement of weapons and of war material in general, but toward supplying the means of placing and maintaining an army in the field. Where 100 years ago but one explosive was known, modern chemical science has supplied hundreds, and the end is not yet. Whereas, in the days of our grandfathers, any respectable foundry could turn out serviceable guns, to-day the gun is the finest product of metallurgical science, and its construction necessarily limited to specialists. Instead of the flintlock, harmless beyond 200 yards, we have the magazine rifle, sighted up to 1,800 yards, and deadly two miles and more away. The muzzle-loading field-piece of limited range and accuracy has given way to the rapid-fire, breech-loading field gun, delivering from 10 to 15 aimed rounds of shrapnel a minute upon a target so distant as to be practically invisible to the naked eye, with an accuracy so great in trained hands that exposure is suicide. Under these conditions the masses of elder days have dissolved into thin lines of invisible skirmishers, and cavalry has all but disappeared from the field of actual conflict. In general, armies have increased vastly in size, and the important battles of the future will probably last for days.

In war, as in everything else, the secret of success lies in organization and preparation. It is interesting, then, to note how two separate and apparently independent conditions have been combined in the evolution of the modern army. The first of these in time, and, with reference to actual combat, in importance, is the creation of the army corps by Napoleon in 1805. What a long step forward this was may be inferred from the fact that Frederick the Great's army was not formed into even brigades and divisions. Besides assuring unity of command, the creation of this strategic unit has led in modern times to the full recognition and definition of the "tactics of the three arms." All modern armies, therefore, whether they belong to military or to unmilitary nations, on taking the field are formed into corps, and these corps are maintained as organic units in times of peace by the great military nations of the world for administrative as well as for purely military reasons.

Hardly less important as leading to a principle of organization was the limitation imposed by Napoleon after Jena upon the size of the Prussian army. This was never to exceed 42,000 men, and, in fact, it never did; that is, at no time while the limitation was in force did Prussia keep more than that number of men under arms. But, thanks to Von Scharnhorst's foresight and intelligence, the members of this army were continually changing. As fast as trained, they were liberated to make room for new and untrained men. With the immediate results of this idea we are not here concerned: what we wish to bring out clearly is that this plan of organization, originally local in both time and circumstances, is to-day fundamental in the formation of the armies of all military states. Indeed, these, if the paradox be permissible, may be said not to have a regular army at all. Great Britain has one, as have the United States, but in all other important nations the condition of universal military service has made the distinction superfluous, if not meaningless, by wiping out one of its terms. Hence, with the exceptions noted, a mold exists, so to say a form, through which all citizens capable of bearing arms have to pass. From this comes the dictum, "The army is to-day the nation in arms," as distinguished from the purely professional army of the earlier part of the century. The application of the principle of universal service has resulted naturally in a classification of the male population with respect to service. Thus we find in Germany the active army made up of the men with the colors, the reserve of the active army, the Landwehr, and the Landsturm (q.v.). Classes more or less similar exist in other countries under different names, the underlying principle being, however, substantially the same in all. This principle further leads directly to the distinction between peace footing and war footing, passage from the one to the other being effected by mobilization, an operation unknown at the opening of the century. Since, moreover, the whole nation is the army, it results that the modern army has greatly increased in size, a result that would prove embarrassing but for the existence of the staff. It is clear that the formation, instruction, training, supply, and administration of this army form a task of the greatest magnitude. Furthermore, when once formed, if it be not intelligently led and accurately directed upon its objective, it runs the risk, from its mere size, of degenerating into an armed mob. Hence the conditions leading to the formation of the modern army have led, *pari passu*, to the formation of the modern staff. This simply means that by a natural evolution the functions of the staff have expanded until they now include duties not formerly contemplated. Thus the conception of a general staff, whose special business it is during times of peace to study and prepare for any campaign whatever on any theatre of war whatever, is distinctively modern. The existence of such an organization is evidently a necessity due partly at least to the great size of modern armies. This very condition, by increasing the difficulties involved, has suggested the only cure of these difficulties — a body of specialists trained to weigh them in peace and to remove them in war. And so of the administrative staff under the same conditions: the supply of an army, taking that term in its most comprehensive sense, is reduced to a continuously operating system. Obviously this particular question could not be left to look to chance for its answer.

The limits of this article forbid more than a mere mention of the influence of the railway and of the telegraph. Without these, rapid concentration and regular supply would be impossible, a matter of capital importance in view of the great numbers enrolled. It would be hazardous to assert that the railway has been a prime factor in determining these numbers, but there can be no doubt that it has wielded a great influence in this direction. Other things being equal, it is logical and proper to have a large army, because the means of transporting and of supplying a large army are at hand. We are speaking here of railways in a strategic sense.

The art of war is usually defined to consist of two elements, strategy and tactics. Of these, the former is essentially immutable, its principles, few and simple, having remained unchanged throughout the whole course of history. The only recent development in strategy is one, therefore, affecting not its principles, but the means of applying those principles. The employment of the railway and of the telegraph has greatly increased the rapidity with which strategic combinations may now be carried out, and has added to the number possible within a given time and area. In general, then, strategy is not a measure of the changes occurring between any two given epochs, while tactics, on the contrary, responding sooner or later, if not instantaneously, to any new influence, does furnish such a measure. We shall here briefly consider the tactics of infantry from this point of view, because this arm is still the «queen of battles,» and the others have to conform to its possibilities.

To clear the way, let us recollect that the tactics of infantry had remained substantially unchanged from the days of Gustavus Adolphus to those of Frederick the Great; that the latter, by the use of lines in place of columns as a habitual formation, had increased the mobility, and, by the substitution of an iron for a wooden ramrod, the rate of fire, of his troops. As, however, the range of the musket was extremely limited, fire was opened at very short distance, and, independently of any system of tactics, the bayonet was, therefore, a weapon of great importance. Indeed, it might happen on a rainy day that the bayonet was the only weapon available. As was but natural, Frederick's system, known as the «linear» system of tactics, was copied by all other armies.

With the French Revolution came a change. Unquestionably inspired by our own Revolution, in which, for the first time, skirmishers appeared on the field of battle, the French, abandoning the precise linear system, substituted therefor small columns for maneuver and assault, and deployed lines for firing. In maneuvering, skirmishers covered the front, unmasking it as each company arrived on the firing-line. We note at once that this employment of skirmishers is not the modern use, but, nevertheless, it marks the breaking of tradition. The French system, known as the perpendicular, was followed in all Napoleon's earlier campaigns. In 1805, he prescribed that the normal formation of the division should be by «linked brigades,» a disposition carrying with it the advantage of giving each brigade a separate objective. This principle is to-day fundamental in combat-tactics, even the company having its designated objective.

Frederick's system, decisively beaten at Austerlitz, was finally overthrown at Jena-Auerstädt, and, in 1813, the tactics of the French, including the use of skirmishers, became universal. But before this the English had adopted a two-rank formation, and had successfully opposed thin lines to the heavy columns which the French, for reasons into which we need not here enter, had apparently found themselves compelled to re-adopt in the Peninsula. In fact, the type-formation was not as yet firmly fixed, the English using heavy columns at New Orleans, and the French, in spite of their experience in Champagne, resuming them with disastrous results at Waterloo.

All the changes here touched upon, it will be noticed, are independent of any change or improvement in weapons, and are simply efforts in the direction of increased mobility and flexibility. Passing by the Crimean war in which, apparently, the experience of the past had been totally forgotten by both sides, we reach our own Civil War, «remarkable as a turning-point of tactics, there being scarcely a feature of the tactics of the present day that did not have its germ, its prototype, or its development in that great contest.» Both armies were now armed with the rifle, the extreme range being one thousand yards, and in the Union army the breech-loader made its appearance before the end of the war. Markmanship was of a high order on both sides, and infantry fire consequently so deadly as to effect marked changes in tactical formations. These are, briefly, attacks by rushes, attacks in successive deployed lines, the use of heavy lines of skirmishers in place of the old line of battle, and the use of hasty intrenchments. They were brought about by the common sense of the American soldier, who, unhampered by tradition, knew how boldly to adapt his tactics to the confronting situation. The only further comment necessary is that these changes now constitute the normal order in all civilized warfare.

Europe, however, was slow in learning the lessons of our war. In 1866, the Prussians, using the breech-loader against the Austrian muzzle-loader, generally attacked in company columns, preceded by skirmishers, who were ordered to feel and develop the enemy, and not, as at present, to begin and carry on the combat from beginning to end. But the Prussian privates instinctively left their columns to join the skirmishers, with the result familiar to all. Strange as it may seem, the Prussian authorities failed to appreciate the new conditions of warfare, for, deprecating «the disorder and tumult of the impromptu attack-formation, which had sprung into being under the Austrian fire, . . . they waited for the appalling losses of a greater war to emphasize the necessity of a change in their prescribed tactical methods.» This experience came in 1870. Both combatants were now armed with the breech-loading rifle, the Chassepot being effective at 1,300 yards. Before the end of the war, under the superior musketry fire of the French, the Germans found themselves compelled to deploy their columns, the direct attack being made, and the hostile position invariably carried, by the rushes of swarms of skirmishers. All the nations of Europe now hastened to bring their tactical systems into agreement with the experiences of the Franco-Prussian war. But it took still another war to drive home the conclusions reached by us in 1861–5. The Turks, in 1877-8, armed with the Peabody-Martini rifle, a weapon vastly superior to any heretofore used, by their use of the American system of hasty intrenchments compelled the Russians finally to deliver their assaults in successive lines of deployed battalions.

This very brief outline shows us that the revolution wrought in infantry tactics during the last half-century has been due almost wholly to the improvements in the rifle. The most recent of these, namely, the introduction of rapid fire through the use of a magazine, will simply carry on the development along the lines already laid down, while the advent of smokeless powder has increased the powers of the defense. All the conditions of the modern combat, therefore, combine to make the frontal attack the exception, flank attack the rule, a principle which is characteristic of modern tactical methods.

But progress has been marked in other

directions as well. We may remark the importance of "combined tactics," or "tactics of the three arms." This, of course, is not a new idea; it has simply received fuller expression through a more stringent application of the principle of division of labor, growing out of the universal recognition of the corps as a strategic unit. As this is really a complete army in itself, though on a small scale, so its full effect can be felt only in case all the arms composing it act in concert to secure the common end. Hence, the powers of the three arms are, perhaps, more accurately measured, their relations to one another better adjusted. The new role of cavalry, too, deserves notice. If it has lost its former weight on the actual battlefield through the power of both infantry and artillery fire, it has gained in consequence of its employment in independent masses. Operating far in advance of the army, it is the purpose of these masses to cover its concentration and to screen its movements, while seeking at the same time to prevent the formation of the hostile forces, and in any case to discover their emplacements, numbers, and objective.

In other ways, too, it has gained. The dismounted fire-action of this arm — that is, its action on foot as in infantry — is now recognized, the alternative being helplessness on the tactical defensive. So highly have we developed this mode of using cavalry in our own country, that many foreign writers have asserted that our cavalry is only mounted infantry. Our answer is that all European mounted troops are either reluctantly or unconsciously conforming to the type of the American cavalryman of 1864–5, without abating one jot or tittle of their right to be, and to be called, cavalry. In England chiefly, a solution has been sought in the creation of mounted infantry. The idea here is that the horse shall serve purely as a means of rapid transportation, his rider dismounting on reaching the scene of action. No better example can be found than that furnished by the British themselves in South Africa, in their attempts to cope with the mobility of the Boers. The reader will recognize at once in the mounted infantry a reversion to the original type of dragoon.

We may fitly conclude this part of the discussion by drawing attention to the increased responsibilities devolved by modern conditions of warfare on the private in the ranks. He has ceased to be considered a machine, mere food for powder, a molecule of the mass whose shock is to crush the adversary. On the contrary, as many occasions will surely arise calling for the exercise of sound judgment, so is he expected to be an intelligent element of the national defense, his value to his country bearing a direct ratio to the degree to which his intelligence can be awakened and trained.

No survey of the military century would be adequate without some reference to the immense development given by the mechanical spirit of the age to the enginery of war. Of course, the impulse in question is not purely military; it is simply the application to war of a principle pervading every other phase of life. In general, every invention that might possibly increase the economy, certainty, or rapidity of a displacement, whether of men, of material, or of projectiles, has been summoned to give its share of improvement. All inventions bearing on the transmission or acquisition of intelligence have been pressed into service. One of the latter is the balloon — antedates the century, but the idea of photographing the enemy's position from its car is new. So is the application of wireless telegraphy to purposes of communication in the field; this invention is turned to a military end almost before it has definitely left the inventor's hands.

The greatest advance, however, has been in the perfection of man-killing machinery. Upon this one subject have been expended all the resources of modern metallurgical and chemical skill until the projectile weapon of the day, whether gun or small-arm, is a marvel of strength, accuracy, and convenience. From the rude tube of our forefathers we have passed to engines of complicated structure, deadly beyond the limits of unaided vision, and of a rapidity of fire undreamed of even thirty years ago. So great is the volume of fire, so destructive the shrapnel, that in field artillery duels the question of success is reduced to that of being the first to get the range. Each class of guns must now have its special propelling agent, and a serious effort is making to discover some means of launching in safety the frightfully destructive explosives due to modern chemical research.

Side by side with this sort of development has marched that of the art of protection. But here, in contrast with the increasing complexity of the means of offense, we remark the increasing simplicity of the means of defense. At the dawn of the century, the genius of Vauban still prescribed the bastion system for any and all sites to be fortified. Just as in the field, rigid and pedantic notions governed all troop-evolutions, so in fortification the prevailing idea in each case was to furnish a rigid geometrical solution. To-day the idea is first of all to adapt the work to the site, independently of the type. Steel turrets, cupolas, armored casemates, are provided for specially exposed points — a solution made possible by the great general advance in metallurgy. Concrete has displaced masonry, and the face presented to the enemy is always either of earth or, where that is impossible, of steel.

Upon the general question of fortifications, authorities are divided into two camps. Those of the first assert that fortresses cover a mobilization, retard the enemy, allow a defeated army to refit under shelter. Their opponents, on the other hand, maintain that they tie down an army, reduce the numbers of the field armies; that forts will be covered and not reduced; that they will not keep out a superior, and are useless against an inferior enemy; and that a government cannot afford to man them, if the antagonists are otherwise evenly matched. The question will probably always remain open. In the meantime, the frontiers of Europe bristle with forts, and every important capital is the centre of a vast intrenched camp. The great contribution of the century to the question of fortification is not so much one relating to the type, though this is marked, as one relating to the occasion. From hasty or improvised intrenchments these latter days have seen the evolution to such defenses as those of Petersburg and of Plevna, erected not with the deliberation of peace, but under the stress of war, to meet its exigencies as they arise. See FORTIFICATION.

The conditions now laid down mark the character of modern warfare. As the whole energy of a nation — a constant quantity in each case — is sought to be put forth in the shortest possible time, so the period during which this energy is expended is reduced. We may therefore confidently expect that wars between civilized nations, when carried on by the regularly organized forces, will be short. Naturally no limits can be assigned, for these will vary in each particular case, not only with the military factors involved, but also with others, such as the character of the people and the policy of the combatants, to which no arbitrary value can be assigned. We may feel reasonably sure, however, that the great and increasing complexity of modern life, involving international contacts at an ever-increasing number of points, will combine with the military conditions hereinbefore outlined to reduce the duration of war to the utmost. Whether it will put a stop to war, no one can tell. But it should not be forgotten that this very complexity, in these days of "expansion," may itself prove a fruitful source of conflict. In other words, wars of dynasty, wars to maintain the balance of power, are obsolete; should an armed struggle break out in the future, it will probably owe its origin, as it will certainly owe its strength, to the people. See MILITARY ZONES.

C. DE W. WILLCOX,
Captain, Artillery Corps, U. S. Army.

Military Service Institution of the United States, a society of officers of the United States Regular Army, organized in 1878 by Generals Fry, Stanley, Rodenbaugh, Colonel Lieber and others. It was designed as a similar organization of the Royal United Service Institution of Great Britain. The presidents of the American Society have been Generals Hancock, Schofield, Miles, and Ruger. The headquarters are at Governor's Island, N. Y., where the Institution has acquired a library of 20,000 volumes including many rare documents. The society issues 'The Journal of the Military Service Institution.'

Military Telegraph, commonly applied to the use of telegraph wires in warfare as in the Civil War when a corps of engineers constructed temporary telegraph lines from the front to points in the rear of an army. In later years this system has been superseded by the heliograph (q.v.) and still later by wireless telegraphy and the use of flag signals commonly known as wigwagging (q.v.).

Military Tenure. See TENURE.

Military Transport Service. See ARMY TRANSPORT SERVICE.

Military Tribunals. See LAW, MILITARY.

Military Uniforms. See UNIFORMS.

Military Zones are geographical belts of territory which dominate all wars that have large and diversified areas of operation — and these are as well defined as are the right, centre, and left of corresponding divisions, corps, or armies of each contending command. Baron Jomini credits the chief successes of the first Bonaparte to his skill as well as celerity in the occupation of river and mountain boundaries or positions, as three sides of a quadrilateral, of which the centre is the natural base, the fourth side being that occupied by the adversary. All campaigns and field operations may partake of these elements of success when strategic conditions evolve their value. The subject-matter under notice has a larger and more generic relation to the broadest possible field of military activity.

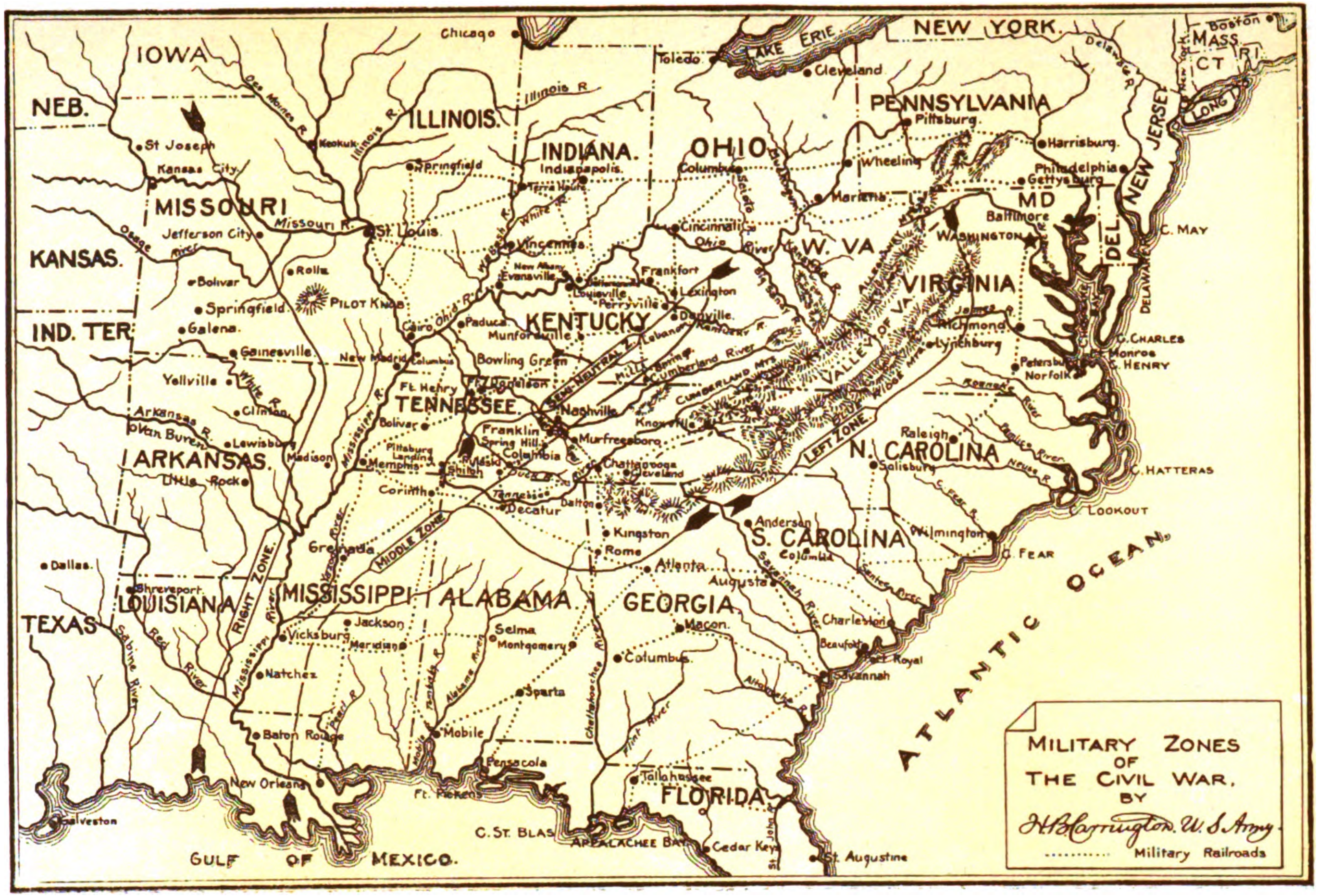
During the American Civil War of 1861–5 more territory was traversed, and more combatants engaged in the struggle than in any other of historic record. The entire central and southern portion, from east to west, constituted the theatre of war, and must be thus regarded in considering the main events which culminated in the Union restored. The right zone for the Federal armies was that of the Trans-Mississippi region, while at the same time indicating the Confederate left. Control of the Mississippi River by either was equivalent to that of an impassable mountain chain. The Federal left, and the corresponding Confederate right, were indicated from the Blue Ridge southward, as far as the Savannah River. The centre zone for each army, meaning the entire military force of each, reached the lower Atlantic coast and the Gulf of Mexico. Irrespective of operations by water, the base of the Federal armies, as well as the objective of Confederate operations, was the region immediately north of the Ohio and Potomac rivers. The Confederates sought only to control Southern territory, proper, while the Federal armies were compelled to restore the entire South to the control of the national government.

The initiative taken in 1861 was a partial surprise to the greater and more populous section; but the year 1862 introduced a contest more truly scientific, and yet one where the smaller numbers carried on operations with marked ability upon almost equal terms with the larger force. The accompanying map illustrates all principal operations, their relations to each other, and to the final result. That part of the central zone styled "Semi-Neutral" has special significance, as it controlled a position more vital to general success than any portion of the famous Austrian Quadrilateral of Napoleon's great Italian campaign, or his operations on the Rhone, toward the North Sea. Within its determining range and area, the city of Louisville and its feeders of supply became a factor of almost supreme control. The Kanawha River on the east, with the Tennessee River on the south and west, bounded this tract of country, while the railroad from Richmond, Va., via Lynchburg, Cleveland, Chattanooga, Decatur and Corinth, running behind the Cumberland Mountains, represented an interior line of speedy transit, which greatly aided the concentration of Confederate armies. Their troops fought alternately near Richmond and at the west, while the transfer of two Federal corps from the Potomac to the Tennessee required a detour through Columbus, Ohio, and even through Indianapolis, Ind., because of low water in the Ohio River at a most critical juncture. Federal preparations for that campaign were stupendous. In the Left zone; on 12 January, Burnside with four brigades, gunboats and transports, sailed from Fortress Monroe with sealed orders, attacked Roanoke Island, 8 February, occupied Chowan on the 20th, Washington on the Pamlico River, on the 21st, and Morehead, the same day. In the Middle zone, Thomas was successful at Mill Spring, Ky., 19 January. On 5 February, Admiral Foote captured Fort Henry. Buell pressed forward to Bowling Green, and occupied Nashville as soon as Grant captured Fort Donaldson. Columbus, Ky., New Madrid and Island No. 10 soon yielded to Federal control, and the Mississippi River was practically within Federal influence. In the Right zone, Springfield, Mo., was occupied by Curtis, and Price retired to Arkansas. On 7 February, Romney, W. Va., had been occupied by Federal troops, and by 1 April, Charleston, Martinsburg, Leesburg, Winchester, Berryville, Sharpsburg and Woodstock had also been taken. The 8th of March witnessed the wonderful episode of the fight between the Merrimac and the Monitor; and by 1 April the Army of the Potomac, 100,000 strong, was before Yorktown. Meanwhile, Port Royal, S. C., Jacksonville and Pensacola, Fla., had been reached by sea, threatening the Confederate base of supply behind the advanced battle-front. Such, briefly, was the Federal initiative of the campaign of 1862, and Grant had reached Pittsburg Landing on the Tennessee River.

But the Confederate forces were neither idle nor disheartened. General A. S. Johnson proposed to unite the armies of Beauregard, Polk, and Bragg, and strike Grant before Buell could reinforce him from Nashville. Bad weather and other unanticipated events lost three marching days to the advancing Federal armies, so that the surprise and partial rout of Grant's command on 6 April was not fully relieved from danger until Buell's corps brought timely and adequate support that evening. Beauregard fortified Corinth, upon succeeding to command after the death of Johnson, and on 30 April retired in good order from overwhelming Federal forces under Halleck, who succeeded Grant, but did not follow up pursuit. At this time, the military approach to Yorktown, in the Federal Left zone, had been advanced, ready for assault; when, as at Corinth, the Confederate commander abandoned a defenseless position, preserving his force intact, with no loss of prestige or credit. Federal movements on the Chickahominy, with the battles of Fair Oaks, Gaines' Mill and Malvern Hill, brought the army of McClellan to Harrison's Landing, only to be summoned at once to Washington, there to be confronted by the same Confederate divisions which had faced them before Richmond. Stevens was recalled from Port Royal and Burnside from North Carolina. The Confederates had taken the offensive, and forced the Federal troops back upon their original base. A call for 300,000 volunteers and 300,000 drafted men followed. On 15 September, Harper's Ferry was surrendered with 12,000 men. On the 18th, followed the battle of Antietam; and yet, when the army, largely reinforced, sought to renew the fight, it was found, as at Corinth and at Yorktown, that the smaller force had withdrawn from an unequal contest. On 12 November, the Federal army forced the Rappahannock, but was repulsed with heavy loss; and Washington, the Federal capital, was again on the defensive. At the West, equal contrasts marked the issues of the year. On 20 August, Kirby Smith invaded Kentucky, together with Bragg, routed Nelson's army at Richmond, Ky., and seriously threatened both Cincinnati and Louisville. On 19 September, Bragg captured Munfordsville, compelling Buell to return from Nashville to save Louisville from capture and Indiana from invasion. All public stores were removed to the Indiana shore, and heavy batteries were established to prevent the crossing of the Ohio River in case Buell should not arrive to resist the advance of Bragg. Still farther westward, on 2 December, Grant advanced toward Holly Springs and engaged the enemy, but they withdrew in good order. General Sherman attempted the capture of Vicksburg, and upon an error in report of its capture a salute of 100 guns was fired at midnight at Indianapolis, Ind., but the siege had been raised. On 6 December, Bragg moved from Murfreesboro and captured a Federal brigade. In the Right zone, General Hindman, Confederate, was defeated, practically ending operations in that zone, as those of 8 March, at Pea Ridge, had secured to the Federals a similar success. The close of this eventful year witnessed the memorable battle of Stone River; but for the fifth time the Confederate army was skilfully rescued from the pressure of a superior force, and one within fighting distance.

A brief review is suggestive. Curtis and Pope in Missouri, Grant and Buel in Kentucky, Banks at Winchester, Butler planning the expedition to New Orleans, represented no less than ten armies and as many lines of operation, against each of which the Confederates, from their advantageous positions could, just then, concentrate a superior force. The cry: "On to Richmond" as a prime objective, rather than the destruction of armies in the field, frustrated all the grand plans with which the campaign in the Left zone had opened. In the centre, with the Ohio River as a base, and the semi-neutral zone exposed on three of its faces, there was a division of force that rendered the superior numbers of Federal divisions powerless for determining results. Pope along the Mississippi, Grant along the Tennessee, Buel along the Louisville and Nashville railroad, and another force at Cumberland Gap, represented the miserable features of the campaign. Too much ground was covered. The obvious reason for this was the necessity of protecting citizens who in this region were between two fires of differing political bias. Cities were preserved instead of crushing armies in the field. Bonaparte fought at Austerlitz and Wagram rather than be cooped up in Vienna, and Washington more than once neglected Philadelphia to keep his army fresh for the field. It is at least certain, however, that the campaign of 1862 demonstrated the military ability of the Confederate commanders.

It was one of the most trying hours of President Lincoln's life, when, on 9 July 1862, having ordered Generals Halleck and Pope to report to him, in person, he reached the conclusion that some new man must be found, who could control all Federal forces in the three zones, and through universal supervision, realize universal success. The Cabinet was divided. Chase, Seward, and Wells held a conference at the house of Senator Sprague of Rhode Island, William Cullen Bryant being also invited, but not Mr. Stanton; and Mr. Chase declared that "he would surrender the Portfolio of the Treasury before night, unless McClellan were removed." The writer, a guest at the house, was requested to meet Generals Halleck and Pope at the train, and advise them that they "were expected to accompany the Cabinet from Willard's Hotel to meet President Lincoln, at the Soldiers' Home at ten o'clock in the morning." This was


MILITARY ZONES OF THE CIVIL WAR, BY H. B. Carrington. U. S. Army.

Univ. Library, UC Santa Cruz 2001

done. Halleck succeeded McClellan, but the ultimate disappointment was as colossal as was the work to be done.

The campaign of 1862 closed as gloomily for the Federal arms as its opening had been propitious. But its 12 months of vicissitude, rarely, if ever surpassed in human history, had demonstrated that a people who could survive such an ordeal, once reunited, would be invincible against the world. Mistakes were merged in the result. The bad strategy of 1862 yielded to the enormous force which was rallied to meet the sovereign issue, and end the war. In all zones, the pressure began to harmonize and work together. Hood's offensive return in the Middle zone, after the fall of Atlanta, and his defeats by Schofield and Thomas at Franklin and Nashville, ended organized resistance in that zone. When, in addition to control of the sea, Sherman gained the rear of all resisting forces, there was no adequate barrier against Federal success.

For details of the successive acquisitions of territory thereby regained for the Federal Union, see CIVIL WAR IN AMERICA.

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Militia. When the Constitution of the United States was adopted, the term militia was understood to have a definite meaning. By that instrument Congress obtained power "to provide for organizing, arming and disciplining the militia, and for governing such part of them as may be employed in the service of the United States. . . ." The Constitution also created the President "Commander-in-Chief of the Army and Navy of the United States, and of the militia of the several States when called into the actual service of the United States." The Articles of Confederation had provided, "that every State shall always keep up a well regulated and disciplined militia, sufficiently armed and accoutered, etc." When the colonies united against the mother country they joined their quotas of volunteers from the militia, and with them fought the battles of the Revolution, and eighty years later the great Civil War was fought by the militia, using that term in the sense which the government had adopted. By the Act of Congress passed in 1792, the first exercise of its power, the militia was defined to be all male citizens of the United States between the ages of 18 and 45 years, excepting certain specified exemptions. The term thus used by our original lawmakers, with apparent positiveness as to its meaning and as to a conception of its function, has, of course, an interesting history which in brief follows:

English Militia.—As early as the time of Alfred the Great, the division and organization of society in England comprised the enrolment of the people in bands or companies, commanded by a leader, who was elected in the folk-motes, and called ealdorman or earl, and whose authority extended over the county. "By the Anglo-Saxon laws, or rather by one of the primary and indispensable conditions of political society, every freeholder, if not every free man, was bound to defend his country against hostile invasion." Every ten families, as far as convenient those related to each other, formed a tithing, commanded by the "borsholder" in his military capacity, ten tithings formed a hundred, several of these forming a trything, or riding, as the word has been perpetuated in Yorkshire. Three public burdens, the *trinoda necessitas,* were imposed upon the citizen, to serve under arms, to repair and construct fortresses, and to make and repair roads and bridges. The Norman Conquest was the means of creating an army made up of bands which attended the king under the command of their immediate lords by "knight service," but that in no way changed the fundamental character of the militia. It was enacted by Henry II. with the consent of Parliament, that every freeman, according to the value of his estate or movables, should hold himself constantly furnished with suitable arms and equipments, the poorest having to provide himself with a "wambais" or linen coat stuffed with cotton, and a lance. In the time of Edward I. the Statute of Winchester defined these requirements more clearly. "Every man between the ages of 15 and 60 was assessed and sworn to keep armour according to the value of his lands and goods; for 15 pounds and upwards in rent or 40 marks in goods, a hauberk, an iron breastplate, a sword, a knife and a horse. For smaller property less expensive arms. And these provisions were enforced by semi-annual inspections by constables chosen in every 100." From the earliest times the High Constable of the County or Sheriff was the officer by whose authority the citizens were called out, either to drive off predatory bands of robbers, or to assist him when he was in the performance of any duty required by the courts of law. When thus called out for the latter purpose, the body was known as the *posse comitatus,* or power of the county, and to this day the same power is lodged in our office of sheriff and is the ultimate resort of the county officer charged with legal process. The constitutional military force of the kingdom consisted, therefore, of the feudal troops and the *posse comitatus.* But the latter could not be marched out of the kingdom, nor yet out of their shire, except in case of invasion. The sheriff was also charged with the same duty of calling out the militia when the citizens were organized in pusuance of parliamentary enactments, but later when the kings considered themselves to be in need of troops more under their immediate control, he was superseded by Commissioners of Array, although his authority remained unaltered as to summoning assistance for local duties. Prior to the reign of Elizabeth, Lords Lieutenant in the several counties were appointed by the Crown to marshal the militia forces. The people were always exceedingly jealous of their rights, and as a nation insisted more upon pursuing their home labors than upon conquests and achieving glory, and one of the earliest records of this spirit is the enactment in the time of Edward III. made as a restraint upon the infractions of the rights of the people, that no man shall be obliged to equip himself except as has been the custom, and shall not be obliged to leave his shire except when necessity require it for the defense of the realm. Conscriptions and levies were resorted to at times, but were tolerated by the people only when their love for the government exceeded the bounds of resistance or revolution. The civil war of 1642, the result of which was the execution of Charles I., was precipitated and protracted in part by the militia question. The right of the king, as chief executive of the nation, to call the militia into service in time of need, was undoubted, but through the natural jealousy and distrust of Parliament, the power of the king was sought to be curtailed by making the office of Lord Lieutenant irrevocable for two years and giving those offices to the persons approved by Parliament. For six years this was one of the main topics of contention in the wars and negotiations which resulted in the establishment of the commonwealth. The result of the war was to put England under the subjection of Cromwell and his army, and ultimately to fill the people with a great detestation of a permanent military establishment, and the whole course of subsequent legislation upon soldiery was directed with care to avoid the dangers of a standing army. The restoration of 1660 was finally accomplished through the militia of England. To epitomize Macaulay's statement:—It was an exciting time, the flame of civil war was actually rekindled, the nobility put forth their best energies to assemble and train the militia, and train bands were held ready to march in every county. The popular feeling and strength were too great to be disregarded, the old army of 50,000 men was humored as well as intimidated into accepting the unmistakable desire of the nation, and it saw itself destroyed without striking a blow, looking sullenly on the triumphal entry of Charles II. into London, while the militia invested the country with a strength they dared not measure. A force of upward of 120,000 men had been organized to act in this great emergency.

Shortly after the restoration, the Parliament, filled with the idea of how important as well as how trustworthy the militia was, passed a bill organizing it. A horseman was required to be provided, equipped and paid for by every one having an income of £500 a year derived from lands or £6,000 of personal property. And every one whose income or possession was one tenth of those amounts was charged with the equipment and pay of a pikeman or musketeer, and those of less estate were obliged to combine in furnishing horse or foot soldiers. The size of the body of soldiery thus created was estimated at 130,000 men. Regular times for drilling the train bands were appointed, not to exceed 14 days in the year, and the men were not paid by the crown except when called into actual service. For a time, this force became and was a useful and serviceable body, but the influence of the Crown was not lent to perfecting it. The king's desires were rather to obtain possession of an army that could be used to do his bidding however unpopular the acts required might be. James II. was met by the jealousy of Parliament just as Charles I. had been, and it proved for him no less an obstacle. Of a religion that was hated by the mass of the people, and repeatedly thrusting men who were mere tools of the Crown into office, James II. awakened a sense of distrust and opposition; his attempts to raise a regular army, by demands for the necessary appropriations from Parliament, were the occasions of debate upon what the military establishment of the country was and should be. These arguments were renewed pro and contra on different occasions, but the king saw his wishes disregarded when, at the very height of his power, the dangers of a standing army were emphasized by Parliament and a bill to make the militia more efficient was passed at the same time that supplies for the army were granted. The popular feeling was embodied in what was said in Parliament at this time in answer to what the courtiers had to urge in favor of regular troops. Sir Edward Seymour, Sir William Twisden, Sir Richard Temple, and Sir John Maynard, the most learned lawyer of his time, gave vent to these utterances. Said the first of these: The militia might not be in a satisfactory state, but it might be remodeled, and he would rather give a million to keep up a force from which he had nothing to fear than half a million to keep up a force of which he must ever be afraid. The troops enrolled in the regular service, however, continued to increase in number, made necessary through the foreign relations of the English government, but the people accepted the increase reluctantly, always holding fast to the idea of a militia as their real protector. The force of circumstances, when the House of Orange was called to the throne, changed to an extent the feeling of the country in this regard, and danger from foreign foes made soldiers a necessity which the people reluctantly recognized, and without such fear for their domestic content as they had before entertained. The sentiment of the country was again shown when the House of Hanover came to the throne of England, although at this time the regular army had become a permanency, having been continuously provided for on the theory that a standing army was a necessity "for better preserving the balance of power in Europe." In 1757 the militia of England was again reorganized, the impelling motive being that which had always been uppermost in the minds of Englishmen, namely, to take away the pretext for a standing army, and a quota was fixed for each county. The provisions were for five years' service, the position of an officer was made important by proper qualifications, and it was provided that without the exigency of service the companies should not be marched out of their own counties. It was believed that although under the authority of the Crown, the possession of the offices by gentlemen of estates would always insure the services of the militia to the good of the people. This force gradually became, by reason of the limited size, the right given to furnish substitutes, and a progressive necessity to supply pay, clothing, and all other expenses, a feeder for the regular establishment, a distinct species of reserve, and in consequence the free, patriotic and military spirit of the country began to manifest itself by the creation of volunteer organizations. Prior to that time the "militia had enjoyed for many years as compared with the regular forces, a social, as well as a constitutional superiority." The volunteers now replaced, to an extent, that ancient power. The control of the militia of Great Britain was eventually taken from the county and lodged in the Crown in 1871, and since then the militia has been a part of the regular force. One significant fact may be cited from the reports of 1880, out of 92,677 men of the militia, only 585 were six feet, or over, in height. The volunteers were said to represent the national instinct for defense; Lord Brougham called them a National Insurance; General M'Murdo said they were a great training school of citizen soldiers. The laws of England for many years did not allow Roman Catholics or dissenters to serve in the militia, and a serious contest was made by Wilberforce in 1797 to pass a bill removing the disability, but in vain, nor was it until 1817 that the service was opened to them.

The foregoing brief reference to the militia of Great Britain is of greater interest than an account of the militia of Greece, of Switzerland, of South Africa, or of any other country, because it is the foundation of our own militarism. In all free or republican countries, the embodiment of the military spirit is shown by the popular ability to bear arms and to organize for war. The transition of nations from a condition of popular military education, discipline and strength, to military powers, possessing large armies, devoted to war for defense or conquest, is a theme beyond the limits of this article.

American Militia.— The peculiar life of the colonies in America rendered it necessary that the colonists should keep themselves armed and experienced in the use of weapons of defense, inheriting the institutions of the mother country, the existence of a militia was an assumed matter in their organization. The adoption of the Constitution of the United States, above quoted, in 1789 was the subject of innumerable debates and political views and prophecies, and the proceedings of the constitutional conventions concerning the adoption of the clauses relating to the militia are most interesting as a matter of political history; space, however, will not permit an account of them. Singularly enough, South Carolina and Virginia were on the side of giving the government greater power, while Massachusetts and Connecticut were opposed to curtailing the State control. Propositions were successively voted down in attempts to frame the Constitution in this regard among others as follows:

(*a*) To make laws regulating and disciplining the militia, not exceeding one tenth part in any one year.

(*b*) To establish a uniform and general system of discipline for the Militia of the States, and to make laws for arming and disciplining and governing such part of them as may be employed in the service of the United States.

(*c*) To establish a uniformity of arms, exercise and organization for the militia, and to provide for the government of them when called into the service of the United States.

(*d*) To add to the clause reserving to the States respectively the appointment of the officers, the words "under the rank of General Officers."

We have to bear in mind that the majority tried in many instances to yield the very minimum to the general government of the powers deemed essential to that government, and this fact explains the fragmentary character of the provisions as to the militia. But the conviction was general that the militia must be trained with uniformity, and be so organized as to become a defense to the nation, and that the only authority to provide therefor was the general government. Hamilton in the 'Federalist' fully defended the Constitutional plan. Patrick Henry in Virginia was convinced that ruin would follow the adoption of the law. So much concern was felt regarding the militia that among the ten amendments which were promptly made, and declared to be in force 15 Dec. 1791 was that (No. 2), providing "a well regulated militia being necessary to the security of a free State, the right of the people to keep and bear arms shall not be infringed." The State Constitutions and the State laws have from time to time, and invariably, dealt with the militia of the respective States, and are held by the courts to be controlling, so far as not inconsistent with the Federal laws, but they have not been uniform as to service, duty or organization. They have generally provided for organizing those who wished to volunteer, and the respective Governors of States are Commanders-in-Chief of their militia. It has been demonstrated by time that Congress by the Act of 1792 made an ineffective law, by prescribing uniform duties for the entire male population composing the militia, and though thereafter for over one hundred years the law was retained with slight amendment upon the statute book, it was not enforced and was the subject of repeated efforts at modification. The Presidents of the United States, notably Washington, Jefferson, Madison, Adams, Jackson and Van Buren, in their messages to Congress, urged further legislation to create an efficient militia. Elaborate reports were made from committees in Congress, but nothing was accomplished except that in 1808 an annual appropriation of $200,000 was begun, which was increased in 1887 to $400,000, and in 1900 to $1,000,000. Between 1819 and 1825 various bills and propositions were advanced for a classification of the militia, so that only a small part of it should have duty to perform in time of peace, then a board was convened by the Secretary of War which made a report that was transmitted to Congress, recommending the instruction of officers in camps of instruction, ten days each year. Jackson urged encouraging volunteer organizations. The Secretary of War of President Van Buren's Cabinet, in 1840, proposed that 100,000 men apportioned to the States, be maintained by draft or otherwise, to serve four years, one fourth to go out each year, and to form the reserve, continuing as such four years more. The President to order the active portion on duty 30 days each year, and defray all charges for pay, subsistence etc. It is said that no subject, except finance, was more discussed prior to the Civil War, than the militia. The debates in Congress are full of it, reports and bills are numerous both from the War Office and the committees of the Senate and House, but as stated, they were unacceptable, until after the war with Spain. The language of the Constitution "reserving to the States respectively the appointment of the officers, and the authority of training the militia according to the discipline prescribed by Congress," has always been an insurmountable obstacle to Federal control of the militia in time of peace. As indicated, the Army and Congress long endeavored to secure the adoption of a plan to limit the militia to a practicable number, and the volunteer militia, or that proportion which the States have organized into companies or regiments, has, for many years, been regarded as a practicable number, as indeed it will always be, if motives of patriotism and eagerness to acquire military knowledge, can be made the incentives to volunteer, and it be understood by the people that the government wishes to maintain the force to embody such ideals only.

Military Law of 1903.—In 1903, the United States Congress adopted a new Militia Law, by which the militia was defined to be practically all able-bodied males between 18 and 45 years, divided into two classes, namely (*a*) "the Organized Militia," being such forces as may be created, under State laws, regardless of the name they bear, and (*b*) the remainder of the militia. A period of five years is given to all the States to adopt laws making the organization, drill and discipline of their organized militia the same as that of the regular army, and the participation of the States in an annual appropriation of $1,000,000 is made dependent on such State action, and the creation of forces accordingly; the limit in number of troops is apparently that of the law as it stood theretofore; to wit, 100 men for each Congressional representative; meanwhile those States which have been entitled to participate in the annual fund continue to do so, and at once their forces became a part of the "Organized Militia." Authority is given to the President to call forth such number of the militia "organized" or "reserve," as he may deem necessary, in case of invasion, danger of invasion, rebellion, or inability to execute the laws of the Union, and any officer or enlisted man who shall neglect to present himself to a mustering officer to be mustered into the service of the United States, if found fit, shall be subject to trial by court martial. No provision is made for such other portion of the militia who may be called forth. The time of such service shall not exceed nine months. The States are required to have each an Adjutant General, whose duties the State laws define, except as to reports to the Secretary of War; these the latter may prescribe. Provision is made for supplying the States on requisition with arms, belts, equipment, ammunition, etc., the same to remain the property of the United States government. The Secretary of War is required to cause annual inspections to be made, and such States as have the requisite organized militia may obtain so much of their allotment from the annual appropriation as shall be necessary to transport, pay and subsist such portion of their forces as shall engage in field or camp service. The Secretary of War may also provide for the participation of any part of the organized militia of any State in any camp or field maneuvers of the regular forces at or near military posts or defenses of the United States. These charges are from the appropriation for the Army. The militia appropriation is also available for stores, supplies, or publications; and States may also buy such property at army listed prices. The annual duty required is prescribed, and regular officers may be detailed to States for duty with the organized militia. Ammunition for firing and target practice may be supplied at regular military posts, and officers of the militia may be allowed to attend at military schools or colleges of the United States, and be examined to be certified for fitness to be commissioned. The application of the law will test the wish of the people to put a particular part or all of the militia under the control of national authority. The questions involved are national control of the militia in time of peace, national participation in the control of the militia, national control of all or part of the militia through the officers of the Regular Army, or national control through some other agency, wholly or in part under direction of the officers of the Regular Army.

National or State Guard.—For one hundred years the militia has been called the State force, being in time of peace under the State, as in England it was under the County; the new law while recognizing the States' control, seeks to secure uniformity and perfection through active national participation in control, and by the contribution of money and property, and is reported by the War Department to be in process of successful solution. The term "National Guard" has been adopted by some States to designate its organized or volunteer militia. This appellation was adopted by one of the most famous militia organizations of the world, the 7th Regiment of New York, at the time Lafayette visited America in 1824, and in his honor, after the "Garde Nationale." The State of New York appropriated the term in 1862 to describe the organized militia, and other States have followed; but if the organized militia can be made and kept a volunteer body, founded on patriotic service, the term that Massachusetts has used, "Volunteer Militia," is more correct. The organized militia of the States bear names as follows: Georgia, South Carolina and Florida "State Troops"; Arkansas and Kentucky, "State Guard"; Louisiana, "State National Guard"; Rhode Island, "Militia"; Texas, "Volunteer Guard"; Virginia, "Volunteers"; Massachusetts, "Volunteer Militia." The remaining States use the term "National Guard." The War Department U. S. A. publishes a roster of the "Organized Militia of the United States," dated October 1903, showing a total force of 116,542 officers and enlisted men. A table compiled by Captain W. R. Hamilton, U. S. A., to 1 Dec. 1902, showed the State militia to comprise 1,791 generals and officers of their staffs, 4,951 cavalry, 6,671 artillery, 96,808 infantry, making a total of 110,221, for which the State appropriations were $2,639,150 in addition to the national appropriation. The total number liable to military service is estimated at 8,727,500 men. The naval militia of the States aggregated 1 Jan. 1902, 433 officers and 4,447 petty officers and men. Heretofore militia of the United States meant militia called into the service of the United States. The volunteer militia of many of the States, notably New York, contain some military organizations so excellent in drill, discipline, rifle shooting and general military proficiency as to be easily comparable with corresponding bodies in the regular service. This is attained by the work of men who are fond of military labors, and who have patriotic pride in performing them, and by those who know how to utilize such elements in the community. As the officers and men maintain themselves, and oftentimes those dependent upon them, and have civic and social ambitions, as well as those of a military character, it is necessary to be judicious in selecting and managing volunteers, in order to inculcate military knowledge and maintain zeal for public service. It will thus be seen that the subject of the militia is a political, economic and patriotic question of statecraft. The military sciences and their representatives enter because the question relates to the embodiment of national force, but they enter only for the perfection of a result and not for its creation. The Chief Executive of a nation is its Chief Commander, but the military power is subordinate to the civil power, except when the military power must be exercised. Asserting that this should be always kept in mind, Hallam says: "Nothing would more break down this notion of the law's supremacy than the perpetual interference of those who are really governed by another law; for the doctrine of some judges that the soldier being still a citizen, acts only in preservation of the public peace as another is bound to, must be felt as a sophism even by those who cannot find an answer to it.»

Bibliography.— Concerning the English institution consult Edward, Earl of Clarendon, 'History of the Rebellion and Civil Wars in England'; Napier, 'Defence of England by Volunteer Corps and Militia'; Chamberlayne, 'State of England'; Grose, 'Military Antiquities respecting a History of the English Army'; Hallam, 'Constitutional History of England'; Macaulay, 'History of England'; Townshend and Windham, 'Plan of Discipline for Norfolk Militia' (1760); and for the United States, reference may be made to Elliott's 'Debates,' Curtis' 'Constitutional History of the United States,' American State Papers (Military Affairs), Congressional Debates, Reports of Secretaries of War, and of Congressional Committees, Messages of Presidents to Congress, opinions of Attorney Generals, and numerous Court decisions, both in the Federal and State Courts. Among the former, reference should be made to the opinions of Justices Washington, Johnson and Story (in Houston *v.* Moore, 5 Wheaton, 1), of Justice Story (in Martin *v.* Mott, 12 Wheaton, 19), of Chief Justice Taney (in Luther *v.* Borden, 7 How., 1).

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Milk may be defined as the normal secretion of the mammary glands. The milk of all mammals is similar in qualitative composition, consisting essentially of water, fat, proteids, milk-sugar and salts or ash. Colostrum, the fluid secreted for a short time immediately after giving birth to the young, is composed of similar substances, but differs considerably from normal milk in its quantitative composition and physiological properties. The average percentage composition of some of the more important milks is approximately as follows:

	Water	Fat	Proteids	Sugar	Ash
Human milk.	88.00	3.80	1.50	6.40	0.30
Cows' milk...	87.00	4.00	3.35	4.90	0.75
Goats' milk ..	85.70	4.75	4.30	4.45	0.80
Ewes' milk...	80.80	6.85	6.55	4.90	0.90
Asses' milk..	89.50	1.75	2.00	6.25	0.50
Mares' milk .	90.75	1.20	2.00	5.70	0.35

Human milk varies to such an extent that any attempt to state its average composition is liable to be misleading. The percentage of any constituent, and especially that of proteids, may differ widely from that given above while the milk is still entirely normal. Such differences are found not only in the milk of different women but in that of the same woman at different periods of lactation.

Cows' milk differs from human milk in containing less sugar and considerably more proteids and ash. The proteids are also of a somewhat different character, the casein being more easily coagulated and forming a denser curd. Goats' and ewes' milks being rich in fats and proteids are well adapted to the manufacture of cheese and are largely used for this purpose in some parts, of Europe. Asses' and mares' milks have been recommended as preferable to cows' milk for infant feeding, since they show some resemblance to human milk in the amount and nature of the proteids which they contain. In this country, however, the milk of the cow is the only one of commercial importance. Unless otherwise explained all of the statements which follow will be understood to refer to cows' milk, but many of them are true of the milk of other mammals as well.

Cows' Milk.— The constitution of cows' milk has been concisely stated by Richmond: "It is essentially an aqueous solution of milk-sugar, albumin and certain salts, holding in suspension globules of fat, and in a state of semi-solution, casein together with mineral matter. Small quantities of other substances are also found." As regards its physical properties, milk is an opaque, white or yellowish fluid, somewhat heavier and more viscous than water, having a faint characteristic odor and a slightly sweetish taste. The yellowish color is due to the fat and the opacity and viscosity in part to the fat and in part to the casein and lime salts present. The specific gravity is usually between 1.029 and 1.034 at 15.5° C. (60° F.). Normal fresh milk shows toward litmus an amphoteric reaction, and reacts acid with phenol-phthaline. This property is attributed to the presence of phosphates and of carbonic acid. The gases contained in cows' milk, carbonic acid with small amounts of oxygen and nitrogen, are for the most part evaporated in the usual processes of handling the milk and therefore need not be further considered here.

Proportions of Water and Solids.—The proportion of water in cows' milk varies considerably, depending upon breed, individuality, period of lactation, etc. While the average amount is about 87 per cent, the mixed milk of a herd may easily show as much as 88 or as little as 85 per cent of water corresponding respectively to 12 or 15 per cent of solids. The milk of a single healthy cow in normal condition may sometimes contain as little as 10 or as much as 18 per cent of solids, while in extreme cases even these latter limits may be passed. The writer has found 19.88 per cent of solids in the milk of a perfectly healthy cow and 27.40 per cent in that of a cow having fever. Over 16 per cent of solids in the mixed milk of a herd or over 18 per cent in that of an individual is, however, comparatively rare.

Breed.—While much depends upon the individual cow, it is well known that some breeds tend to yield richer milk than others. The following figures, obtained by averaging the records of tests made at the New York and New Jersey Agricultural Experiment Stations, serve to illustrate the variation in richness of milk yielded by different breeds:

BREED	Total solids per cent.	Fat per cent.	Solids not-fat per cent.
Jersey	14.87	5.19	9.68
Guernsey	14.69	5.16	9.53
Shorthorn	13.38	4.05	9.33
Ayrshire	12.73	3.64	9.09
Holstein	11.96	3.43	8.53

Advance of Lactation.—After the third or fourth month, the milk tends to increase in richness as lactation advances. A study of nearly fifty lactation periods of individual cows at the New York State Experiment Station, yielded the following average results, the observation being continued in each case for ten months:

Months	Total solids per cent.	Fat per cent.	Solids not-fat per cent.
First month	14.00	4.54	9.46
Second. month	13.50	4.33	9.17
Third month	13.47	4.28	9.19
Fourth month	13.64	4.39	9.25
Fifth month	13.75	4.38	9.37
Sixth month	14.00	4.53	9.47
Seventh month	14.18	4.56	9.62
Eighth month	14.33	4.66	9.67
Ninth month	14.46	4.79	9.67
Tenth month	14.83	5.00	9.83

In the last few days of lactation, when the yield becomes very small, the proportion of solids often rises to a marked degree, sometimes reaching 20 per cent or over.

Food, Weather, etc.— Other conditions being the same, milk is richer in winter than in summer, in cooler than in warmer weather, and on rich dry food than on pasture, except that on first turning the cows to pasture a richer milk may be obtained for a time. Probably anything which induces a greater consumption of food has a tendency to increase at first the richness of the milk secreted. In most cases, however, such increase in richness is found to be only temporary, the more permanent influence of better feeding being to improve the quantity rather than the quality of the milk produced.

Partial Milking.—All of the statements regarding the composition of milk refer to the product of a complete milking. In partial or fractional milking the first portions drawn are comparatively poor and the last portions or «strippings» are much richer.

Milk Fat.— Milk fat, like other fats, is a mixture of glycerides (compounds of glycerine and fatty acids). It differs from other animal fats in containing a smaller proportion of stearic acid and large proportions of the acids of lower molecular weight. A recent study of the constitution of milk fat by Browne gave the following results:

Acid	Per cent of acid obtained	Corresponding per cent of glyceride
Oleic	32.50	33.95
Dioxystearic	1.00	1.04
Stearic	1.83	1.91
Palmitic	38.61	40.51
Myristic	9.89	10.44
Lauric	2.57	2.73
Capric	0.32	0.34
Caprylic	0.49	0.53
Caproic	2.09	2.32
Butyric	5.45	6.23
Total	94.75	100.00

The last four acids are the «volatile fatty acids,» the large amount of which serves to distinguish milk fat (butter) from other fats which as a rule have only a fraction of a per cent of these acids. In the milk the fat exists in the form of minute suspended globules which vary considerably in size but average about $\frac{1}{10000}$ of an inch in diameter. A drop of average milk contains over 100,000,000 fat globules. Formerly it was believed that each globule was surrounded by an envelope of proteid matter, but it now appears certain that no such envelope exists and that the fat particles float freely in the milk in the form of an emulsion.

Amount of Fat in Milk.—The percentage of fat in milk varies more than that of any other solid constituent, or indeed, of all the other solids combined. In the mixed milk of herds where the influence of individual cases of advanced lactation is minimized, we may consider the usual range to be from 3 to 6 per cent of fat and from 8.5 to 9.5 per cent of solids not fat. Hence the varying richness of cows' milk is due principally to differences in fat content, and as fat is also the constituent of greatest pecuniary value, a «rich» milk is essentially one containing a high percentage of fat.

Nitrogenous Compounds or Proteids of Milk.— Not all of the nitrogenous compounds found in milk are true proteids, but since the amount of nitrogen in other forms is exceedingly small, it has become customary to use the term proteids or «protein» as synonymous with nitrogenous compounds. The number of such compounds which have been reported as occurring in milk is quite large. Some of these, however, are accidental or abnormal constituents and others occur only in very minute quantities. The greater part of the nitrogen in milk (usually over three fourths) is in the form of casein, a compound proteid which contains phosphorus in organic combination and is probably also combined with lime salts. Casein is readily coagulated by acids or rennet and the curd thus formed encloses the greater part of the fat which the milk contained. Of the nitrogen compounds other than casein, albumin is by far the most abundant. Milk albumin is not coagulated by rennet, nor by acids at ordinary temperatures, but is coagulated by heat. In addition to casein and albumin, milk contains small amounts of other proteid bodies including the enzymes or unorganized ferments which play an important part in cheese-making, and probably aid the digestion when milk is consumed in the fresh state without previous heating. Among the nitrogenous compounds other than proteids which have been found in milk, may be mentioned small amounts of lecithin, hypoxanthin, creatin or creatinin, urea, and traces of ammonia.

Amount of Proteids in Milk.— Formerly, through faulty methods of separation, the reported percentages of proteids were very often inaccurate and were usually too high. The amount of proteid matter as determined by modern methods is usually between 3 and 4 per cent, being higher in those samples which are rich in fat. Average milk with 13 per cent of solid matter usually contains about 4 per cent of fat and 3⅓ per cent of proteids. In richer milk the increased amount of solids is usually made up of about three fourths fat and one fourth proteids. In other words, the percentages of fat and proteids tend to rise and fall together approximately in the proportion represented by the formula — Proteids $= 2.00 + \frac{1}{3}$ Fat. Variations in fat, especially if due to temporary causes, are not always accompanied by so much variation in proteids as the formula would indicate. On the other hand, the percentage of proteids is apt to exceed that indicated by the formula, in very advanced lactation. As a rule when the amount of solids-not-fat exceeds 9 per cent, the excess is due chiefly to excess of proteids.

Milk-Sugar.— Milk-sugar, or lactose, has the same composition as cane-sugar, but differs from the latter in some of its chemical properties and is less sweet and less readily soluble in water. The amount of sugar is rather more constant than that of proteids, being usually between 4.5 and 5.25 per cent in normal milks. While the latter figure is rarely exceeded, occasional samples may show considerably less than 4.5 per cent. In any genuine milk containing an unusually low percentage of solids-not-fat, the deficiency is apt to be principally in the milk-sugar. Such milk is apt to be yielded in case of fever or unusual excitement or fatigue, and may sometimes be obtained from apparently healthy cows under normal conditions, especially during hot, dry weather.

Salts or Ash of Milk.— When milk is dried and burned there remains a white ash, the average composition of which is stated by Fleishmann and Schrodt to be:

	Per cent
Potassium oxide	25.42
Sodium oxide	10.94
Calcium oxide	21.45
Magnesium oxide	2.54
Ferric oxide	0.11
Sulphuric anhydride	4.11
Phosphoric anhydride	24.11
Chlorine	14.60
	103.28
Less oxygen equivalent to chlorine	3.28
	100.00

A part of the phosphoric anhydride of the ash is derived from the phosphorus of the casein. The sulphuric anhydride also comes from the oxidation of the milk proteids. If these acid constituents are deducted, the bases in the ash are found to be in considerable excess. In the milk these bases are combined partly with the casein and partly with citric acid, a very small quantity of the latter being a normal constituent of cows' milk. The amount of ash does not, therefore, exactly represent the mineral matter originally present. The ash of normal milk is usually between 0.65 and 0.80 per cent, averaging about 0.73 per cent. The ash tends to vary with the proteids approximately in the proportion — Ash = 0.38 + 1/10 Protein.

Preservation of Milk.— Milk produced under usual conditions contains large numbers of bacteria. At ordinary temperatures these multiply rapidly and soon cause such changes as to render the milk unsalable, if not unfit for use. Various preventive measures may be adopted, either to prevent bacteria from getting into the milk, to check or control their growth, or to destroy them entirely. Strict cleanliness and the use of sterilized utensils exclude a large proportion of the bacteria usually present in milk and greatly improve its keeping qualities. If such milk is protected from access of air and kept cold, it will remain sweet and fresh for at least two or three weeks without any other preservative measures. The sanitary production and handling of milk are more fully described in the article: DAIRY INTERESTS, AMERICAN. In this respect the American dairy practice is much in advance of that of other countries, as was strikingly shown at the exhibit of dairy products at the Paris Exposition of 1900. Three dairies engaged in city milk supply, one in New York, one in New Jersey, and one in Illinois, sent regular shipments of fresh milk and cream to Paris throughout the summer. These products were found to be sweet and sound when opened from 15 to 20 days after bottling, and it was only with great difficulty that European dairy experts could be convinced that nothing but «cleanliness and cold» had been used to preserve them. No other country except France attempted to show natural milk and cream and the French exhibits were all sour on the second or third day.

It is evident that milk may be preserved much longer than is usually necessary by the observance of cleanliness to exclude bacteria as far as possible and the maintenance of a low temperature to retard the growth of those present. In order to preserve milk produced under unsanitary conditions or which has been carelessly handled and not kept properly cold, it is sometimes necessary to adopt other methods to kill the bacteria present or to retard their growth. For this purpose milk is either heated or treated with chemical preservatives.

Sterilization and Pasteurization.— When milk is heated to the boiling point, all active bacteria are killed. Such milk is commonly called «sterilized,» but is not strictly sterile because of the presence of spores which subsequently develop into active bacteria. In order to render milk absolutely sterile, it must be heated several times at intervals until all of the spores have developed into bacteria and been killed. Boiled milk is somewhat changed in appearance and has a «cooked» taste, which is unpleasant to most people. Heating to a temperature of 140° F. destroys the greater number of the bacteria usually found in milk, including any disease germs likely to be present and all those species to which the ordinary souring of milk is due. This process is called pasteurization. It is very generally practised abroad and until recently has been advised by many writers in this country. But the recommendations for pasteurization made by European writers have little application in America, where a better milk supply is available and ice is much more freely used, and it is now known that the pasteurization of milk is attended with serious disadvantages. Thoroughly pasteurized, or ordinary so-called «sterilized,» milk will seldom sour, but unless kept very cold certain spores which are often present will germinate and produce bacteria which attack the proteids, forming products more or less poisonous, which are believed to be the cause of many of the digestive disorders, especially of infants and children. In natural milk such products are rarely formed in any appreciable quantity, because the more rapid growth of the lactic acid bacteria prevents the development of those species which attack the proteids. The heating of milk tends in itself to change the proteids somewhat and render them slightly less digestible, at the same time destroying the activity of the enzymes present which are believed to aid digestion. It is evident, therefore, that the heating of milk to improve its keeping quality is not to be recommended where ice is obtainable, and that when pasteurization is resorted to through fear of disease germs, the milk should nevertheless be kept cold until used. The public should demand milk produced under such known and satisfactory conditions as to make pasteurization wholly unnecessary.

Chemical Preservatives.— Various substances have the power of preventing or retarding the growth of bacteria. Those most often used to prevent milk from souring are boracic acid or borax, and formaldehyde. Less frequently salicylates, chromates, fluorides, and other substances may be found. All of these substances are highly injurious when taken in sufficient quantity and their use is illegal in most States, but they are often sold under fanciful names and doubtless frequently used without knowledge of their real nature. According to the Yearbook of the United States Department of Agriculture for 1900, boracic acid and borax are sold as «Preservaline,» «Superior Preserving Powder,» «Nonpareil Preservative,» «Australian Salt,» «Antisepticum,» «Antisourine,» «Ozone Antiseptic Compound,» «Rex Magnus, Snow Flake Brand,» etc.; Formaldehyde or «Formalin» as «Freezine,» «Iceline,» «No Ice Needed 'M' Preservative,» «Patent 'M' Preservative,» «Milk Sweet,» etc. The strongest incentive to the use of such preservatives is the saving of ice, and it is safe to say that as a rule their use tends to encourage carelessness and neglect not only as to refrigeration but as to cleanliness as well. The attempts to determine the exact physiological effects of small amounts of these substances have given somewhat conflicting results, and the claim is sometimes made that the quantities which would be used as food preservatives would not be sufficient to cause any injury to health. It may, however, be accepted as a general principle that any substance which prevents fermentation to such an extent as to be useful as a preservative must to some extent retard the action of the digestive ferments, and it is entirely probable that an amount too small to have an appreciable effect upon a healthy adult might be highly injurious to an infant or an invalid. Since milk often forms the sole food of infants and invalids, the use of chemical preservatives is more highly objectionable in milk than in other foods and should be strictly prohibited.

Milk is sometimes treated with carbonate or bicarbonate of soda which neutralizes the lactic acid which would otherwise make the milk sour. These substances do not check the growth of bacteria but simply mask the results of their activity. By neutralizing the lactic acid they favor the growth of the bacteria which attack the proteids as well as those which affect principally the milk-sugar. Such milk, therefore, tends to become unwholesome more rapidly than milk to which nothing is added.

Methods of Analysis and Detection of Adulterations.— The complete analysis of a sample of milk requires much time and elaborate apparatus and is not practicable for others than trained chemists. The tests described below are more easily performed and if carefully carried out will in many cases yield all the information required. Before taking a portion for any determination the milk to be tested should be thoroughly mixed by repeatedly pouring it from one vessel to another.

Determination of Fat.— Since fat is both the most valuable and the most variable of the solids in milk, its determination is often required. This may be accomplished by the method devised by Dr. S. M. Babcock, of the Wisconsin Agricultural Experiment Station, and popularly known as the Babcock test. In making this test, a measured amount of milk is treated with about an equal volume of commercial concentrated sulphuric acid which dissolves the other constituents, leaving the fat free in a heavy solution from which it is separated by centrifugal force and collected in the graduated neck of the test bottle, where its volume is read off at once on the completion of the test. Complete directions are furnished with the testing outfit, which can be purchased for a few dollars from dealers in chemical apparatus or dairy supplies.

Determination of Specific Gravity and Estimation of Solids-Not-Fat.— Since the specific gravity of milk is raised by all of the other solids and lowered by the fat, it follows that after the influence of each has been determined, it should be possible to estimate from the percentage of fat and the specific gravity the percentage of solids-not-fat which the sample contains. To determine the specific gravity it is convenient to use a «Quevenne» or a «Soxhlet» lactometer, either of which is practically a hydrometer of sufficient range to cover the gravity of all ordinary milks and so graduated that the thousandths in excess of unity are represented by whole numbers on the scale. Thus a milk with a specific gravity of 1.0315 will give a lactometer reading of 31.5. The temperature should be observed at the same time with the lactometer reading and the latter corrected to 60° F. by adding to the reading 0.1° for each degree F. above the standard temperature of 60° F. One fourth of the corrected lactometer reading plus one fifth of the percentage of fat gives a fairly close approximation to the percentage of solids-not-fat. The lactometer reading may also be useful aside from the estimation of solids-not-fat. Although the addition of cream to milk would lower the gravity, yet in general the lactometer reading is a rough indication of the richness of the milk, because a high percentage of fat is usually accompanied by a high percentage of proteids which raises the lactometer reading. Cases in which genuine milk shows a low gravity as the result of a high percentage of fat are not common and can usually be detected by noticing the viscosity and opacity of the milk as it runs from the bulb of the lactometer. The lactometer reading taken in connection with the appearance is therefore a useful preliminary test and is used as such by the milk inspectors of many cities.

Detection of Skimmed or Watered Milk.— The most common adulterations of milk are the removal of cream (or the addition of skimmed milk, which amounts to the same thing), and the addition of water. For the detection of such practices there are no satisfactory direct tests. Milk which contains less than 3 per cent of fat has usually been partially skimmed, and milk containing less than 8.5 per cent of solids-not-fat has usually been watered, but poorer samples of genuine milk are occasionally found. In most States there are minimum limits established by law and milk falling below the limit is considered to be adulterated. Thus in New York State milk must contain at least 3 per cent of fat and at least 12 per cent of total solids; in Georgia at least 3.5 per cent of fat and 8.5 per cent of solids-not-fat. As stated above, the percentage of fat varies much more than that of solids-not-fat. Skimming is therefore more difficult to detect than watering. In fact, it is usually impossible to distinguish by analysis between a genuine sample containing, say, 3.6 per cent of fat and a sample originally containing 4.5 per cent of fat, one fifth of which has been removed. On the other hand, the addition of 20 per cent of water would almost certainly reduce the percentage of solids-not-fat to a figure considerably below the normal minimum.

Other Adulterants.— The addition of chalk, calves' brains, etc., though frequently mentioned in the older works on food adulteration, is now almost unknown. Cane-sugar or starch may sometimes be added to mask the effect of watering. The former may be detected by the rose-red color produced when about 10 cubic centimetres of milk are boiled for five minutes with 1 cubic centimetre of hydrochloric acid and 0.1 gram of resorcin. To detect the presence of starch, boil about 10 cubic centimetres of milk, cool it thoroughly and then add a few drops of a solution of iodine in potassium iodide. If starch is present a characteristic blue color will be produced.

Artificial Coloring Matter.— Caramel or yellow coloring matter such as is commonly used in butter may occasionally be added to milk. The detection of these is of little practical importance, since they would ordinarily be used only to mask the effects of gross skimming or watering such as would be readily detected by the methods already given.

Detection of Heated Milk.—It has already been stated that milk contains enzymes, the activity of which is destroyed by heating. At least one of these has the property of decomposing hydrogen peroxide with the liberation of nascent oxygen. This property forms the basis of several tests for distinguishing between raw and heated milk. According to Leffmann the best reaction is obtained with 1-4 *diamidobenzene*. When a freshly prepared dilute solution of this substance is added to raw milk and then a few drops of hydrogen peroxide solution, a deep blue color at once appears. Milk which has been heated to 180° F. does not give this reaction.

Detection of Preservatives.— FORMALDEHYDE («FORMALIN»).— Dilute the milk with an equal bulk of water in a test tube and carefully pour in commercial concentrated sulphuric acid, inclining the tube so that the acid and milk will not mix. If formaldehyde is present a violet ring forms at the junction of the two liquids. If pure acid is substituted for the commercial, a trace of some ferric salt should be added. SALICYLIC ACID.— To 50 cubic centimetres of milk add an excess of an acid solution of mercuric nitrate, shake and filter. Shake the filtrate with ether in a separatory funnel, separate, evaporate the ether layer and to the residue add a drop of neutral solution of ferric chloride. In the presence of salicylic acid a violet color is produced. BORACIC ACID OR BORAX.— Evaporate a portion of the milk to dryness and burn to ash. Moisten with a few drops of dilute hydrochloric acid and introduce a slip of yellow turmeric paper. This is turned reddish brown by boracic acid and the color may be changed to bluish black by treating with a solution of sodium carbonate. CARBONATES or BICARBONATES if present in the milk would remain as carbonate after ignition and be shown by an effervescence when the ash was moistened with acid in the test for boracic acid just described.

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Milk-cure. The living on milk alone, or mainly, for weeks is a recognized form of treatment in obstinate hysteria, hepatic congestion, dropsy, and various disorders of nutrition. When the taste of milk becomes disagreeable, salt, coffee, bread, arrowroot, cocoa, rice, etc., may be added as the attending physician decides. The sole use of milk for a length of time may increase the frequency of the pulse, stimulate the kidneys to undue action, coat the tongue, and produce obstinate constipation. When used exclusively, two or more quarts are ordinarily consumed daily. It is not a cure to be undertaken without the supervision of a physician.

Milk-fever (called ephemeral fever when the symptoms disappear very quickly) is a febrile state, the temperature reaching 102° F. or over, occurring in the mother usually two or three days after delivery. It chiefly affects those in a feeble condition or under- or over-fed, or in whom the milk-ducts have not been freed by early lactation. A chill may induce it. It occurs in the lower animals as well as in the human being. It begins with rigors, which are followed by headache, pains in the limbs, fever, swelling and tenderness of the breasts (going on, it may be, to abscesses), and sweating, when the symptoms abate. Pain is to be relieved by hot-water bottles, breasts to be emptied, bowels moved by salines, and fever reduced by diaphoretics; other medicines may be necessary. Owing to antiseptic midwifery, and greater care as to hygienic measures, milk-fever is now-a-days comparatively rare. If not relieved promptly by medical skill, it may prove a dangerous disease.

Milk, Human. This liquid has a specific gravity of 1028.34, and contains water, 87.4; total solids, 12.6; fat, 3.4; albuminoids, 1.2; sugar, 7.0; ash, 0.2. It is slightly alkaline, is sterile, and differs mainly from cow's milk in being sweeter and having less fat and casein. Its fat is more fluid, and the casein is more readily dissolved. Cows' milk is frequently acid, and its casein is often digested with difficulty. Experience shows that an infant should, if possible, be nursed during the earlier months of its life, for human milk is usually adapted to the digestive powers of infants. Its alkalinity, its temperature (98°–100°F.), its chemical constituents aid the development of the child. But poor health of the nurse, mental emotions, improper food, or deranged digestion of the infant may prevent natural feeding or require its cessation.

Milk-leg. See PHLEGMASIA.

Milk-sickness (sometimes called «trembles»), a malignant fever attacking man and some of the lower animals, such as unweaned, calves and their mothers, horses and colts, sheep and goats. Formerly it prevailed in the Western and Southwestern States, recently in North Carolina and Indiana. The cause is not known, though supposed to exist in poisonous herbs eaten by cattle. Man is supposed to be infected by the products of cattle — meat, milk, cheese, or butter. The disease belongs to the end of summer and the beginning of autumn. The symptoms are headache, loss of appetite, fatigue, nausea, vomiting, thirst, constipation, a foul breath, then a typhoidal condition with coma or convulsions. The prognosis is generally favorable, but death may occur in a few days. The duration of the disease is from two or three days to as many weeks. The treatment is supportive and symptomatic.

Milk Snake. See HOUSE-SNAKE.

Milk Stone, or **Galalith,** an artificial substitute for horn, ivory, ebony, amber, etc., made of casein by the following process. Curds are dissolved in hot soapy water, and colored to the proper tint. A precipitate is obtained by a metallic salt; this is thinned and dried on a cloth-covered frame. The resulting mass is rendered insoluble by the addition of formaldehyde. Milk stone is cheaper than the natural materials for which it is a substitute, and is less odorous and inflammable than celluloid.

Milk-tree, any of various tropical trees yielding a milky, wholesome sap. See COW-TREE.

Milk-vetch, a pea-plant of the genus *Astragalus* (see VETCH), regarded as increasing the flow of milk when eaten by goats. Many species grow in the United States, especially on the Western plains, where they are useful fodder-plants, although including one baneful species, the locoweed (q.v.).

Milk'weed. See ASCLEPIAS.

Milkweed, or **Monarch Butterfly,** a large, reddish-brown, black-veined nymphalid butterfly (*Anosia plexippus*) of North America. Its black and green caterpillars, which have a pair of black filaments at each end of the body, are found upon milkweed almost throughout the world. The bright green, gold-dotted chrysalids hang from the under sides of the leaves in midsummer. The adults which are among the strongest flyers of their order, migrate southward in the autumn and hibernate. In spring they fly northward even into Canada. They often form immense flocks in glades, even concealing the bark of trees upon which they alight in the lea of the wind. They are protected from their enemies by scent scales and are imitated by species not so protected, especially in the United States by the viceroy butterfly (*Easilarchia disippus*).

Milky Way, The, or **The Galaxy,** in astronomy a luminous band of irregular form, consisting of a great circle entirely surrounding the heavens. It contains myriads of stars, so crowded together that their united light only reaches the unaided eye; this band of stars can be seen on any dark, clear night. If we could stand where the earth is and have it removed, we could see this splendid circle completely surrounding us; it is thus reasoned that we are a part of the Milky Way, and that our sun is near the centre of it. The circumpolar constellations Cassiopeia and the Swan are always to be found in the Milky Way, while Sirius, Capella, and Aquila may be seen on its edge when they are in sight. The formation of the Milky Way assumes the general appearance of a silvery ribbon, but in places it is divided into two great branches, which afterward reunite. Between these divisions are dark places comparatively devoid of stars; one of these, the Coal Sack, has become celebrated, and was so named by sailors because they could see no stars in this dark spot.

Mill, James, British economist, historian, and utilitarian philosopher: b. Northwater Bridge, Forfarshire, Scotland, 6 April 1773; d. Kensington 23 June 1836. His father was a cobbler, his mother a farmer's daughter, and his early abilities were so marked that great care was taken with his education, so that in 1790 he entered Edinburgh University. There he was carried away with Dugald Stewart's philosophy until he came to know Bentham's system, which he then adopted. But in the University he was better known as a remarkable Greek scholar than as a philosopher. In 1802 he went to London, where he was from 1803 to 1806 editor of the 'Literary Journal,' and then began the 'History of India,' which occupied him ten years. During this time he wrote much for periodicals and came to know Bentham personally; at the same time he was busied with the painstaking education of his children, notably John Stuart Mill (q.v.). The 'History of India,' a wonderfully scholarly and unpartisan work, marred only by his lack of personal knowledge of country and people and a consequent theorizing at times, was published in 1818 and immediately won for him a place in the India Office and relief from his long battle with penury. This position was the more flattering a tribute since he was now well known as a radical and a skeptic. He rose rapidly, becoming head of the Office in 1830. The 'Westminster Review' founded in 1824 as the organ of Bentham's followers contained many contributions by Mill; and several appeared in the 'London Review.' Both in ethics, where his position was strongly utilitarian, and in political economy, where he may still be reckoned as typical of the orthodox school so bitterly attacked by Ruskin, Mill is little more than a follower of Bentham, with greater force, perhaps, because of his comparatively larger knowledge of the world. In psychology, however, although largely a follower of Hartley, his work is more important, for he developed and gave to Hartley's principle of association a wider application, and thus was the founder of the school to which Spencer and Bain belong. Mill took part in politics and contributed largely to the success of the Reform Bill by introducing to England philosophical radicalism. His personal character was strangely unhuman and unlovable, though perfectly correct. His important works besides the 'History of India' are 'Elements of Political Economy,' the first great philosophic treatise on the subject (1821), and 'Analysis of the Phenomena of the Human Mind' (1829). Consult: Bain's biography (1882) and J. S. Mill's 'Autobiography' (1867).

Mill, John Stuart, English social and political reformer, philosopher, economist: b. London 20 May 1806; d. Avignon 3 May 1873. Few have combined so intimately a vital enthusiasm for human progress, with a keenly critical and most scholarly temper. He presents in all his most important lines of work the interesting conflict which results when a candid, open mind, instinct with human interest, attempts to work with narrow conceptions and an inadequate method. The conceptions and method have in many respects been superseded, but the candor and sincerity, the scholarly, investigative temper, the deep interest in all things human, the democratic sympathy which manifest themselves in his works, give them permanent value.

Mill was the oldest son of James and Harriet (Burrow) Mill. His early education, conducted by his father, was extraordinary. He began Greek when about three years old, and Latin at seven, and read a great amount in both languages, especially in Greek, before he was twelve. He studied algebra, geometry and the differential calculus also in this period. History he read of his own accord and found amusement in books on natural science. At twelve Aristotle's 'Logic' began a more advanced course of instruction which included the more difficult classical authors, and ended, so far as his father's personal instruction was concerned, in his 14th year with a thorough study of Ricardo's 'Political Economy.' Mill himself says that it «was not an education of cram.» «Anything which could be found out by thinking I never was told, until I had exhausted my efforts to find it out for myself.» At the same time he declares that it «was in itself much more fitted for training me to *know* than to *do*.» After a year in France, which had an important influence, the reading of Bentham made an epoch in his life. «I now had opinions; a creed, a doctrine, a philosophy; in one among the best senses of the word, a religion; the inculcation and diffusion of which could be made the principal outward purpose of a life.» In the winter of 1822–3 he planned a society to which he gave the name of «Utilitarian,» and thus brought the term into common use. In May 1823 he received an appointment from the East India Company as clerk in the office of the Examiner of India Correspondence. Here he remained 35 years, rising to be Examiner two years before the transfer of India to the British government in 1858, when he retired upon a pension of £1,500. He became a frequent contributor to the *Westminster Review* founded in 1823 as a Radical organ, and in 1834 became editor of a new Radical Review, the *London Review* (afterwards the *London and Westminster*). He was one of an ardent party of «philosophic radicals»; his object in life «to be a reformer of the world.» Bentham, Malthus and Ricardo were influential upon the group. But several new influences now began to unsettle his political and social views. Coleridge, especially through Maurice and Mill's intimate friend Sterling, Carlyle, Goethe, Wordsworth, and the St. Simonians, gave broader views of human interests, and greater importance to feeling and sentiment than James Mill and Bentham. In Mill's own judgment, however, the most important influence, especially in leading «him to apply his abstract principles to the actual state of society and estimate their bearing upon human interests and sympathies more clearly and widely than he would otherwise have done,» was that of Mrs. Taylor, to whom he was first introduced in 1830. He maintained with her for 20 years a friendship of increasing intimacy, and after the death of her husband married her in 1851. Mill loved his wife tenderly and spoke of her, notably in the 'Autobiography,' and in the dedication of the volume 'On Liberty' which was a joint production, in terms which seemed extravagant to his friends. A third period of Mill's mental progress fell at about the time between the first and third editions of his 'Political Economy' (1848–52). In the earlier period, he writes in his 'Autobiography,' «I was a Democrat, but not the least of a Socialist. We were now much less democrats than I had been, because so long as education continues to be so wretchedly imperfect, we dreaded the ignorance and especially the selfishness and brutality of the mass; but our ideal of ultimate improvement went far beyond Democracy, and would class us decidedly under the general designation of Socialists.» In 1858 his wife died of congestion of the lungs in Avignon. When the civil war in America broke out he contributed a strong article on the side of the North. In 1865 he was elected a member of Parliament from Westminster, and took an active part in support of various reform measures, but was defeated for reëlection in 1868. His later years were spent in literary labors until his death, which occurred at Avignon. He had then come to be generally regarded as the foremost living philosopher and economist of England.

Mill's published works are the following: 'System of Logic' (1843); 'Essays on some unsettled questions of Political Economy' (1844); 'Principles of Political Economy' (1848); 'Memorandum of the Improvements in the Administration of India' (1858); 'On Liberty' (1859); 'Thoughts on Parliamentary Reform' (1859); 'Dissertations and Discussions' (1859–75); 'Considerations on Representative Government' (1861); 'Utilitarianism' (1863); 'Examination of Sir William Hamilton's Philosophy' (1865); 'Auguste Comte and Positivism' (1865); 'England and Ireland' (1868); 'Subjection of Women' (1869); 'Autobiography' (1873); 'Nature, the Utility of Religion and Theism' (1874). In addition may be mentioned his edition, with notes, of James Mill's 'Analysis of the Phenomena of the Human Mind' (1869); his 'Inaugural Address delivered to the University of St. Andrew's,' (1 Feb. 1867); 'Speech in Favor of Women's Suffrage' 12 Jan. 1871 (1873); 'Speech on the Admission of Women to the Electoral Franchise,' 20 May 1867 (1867); H. D. Pym's 'Memories of Old Friends,' which contains 14 letters from J. S. Mill (1882); several articles in the *Westminster Review* and the *London and Westminster Review,* not reprinted in the 'Dissertations and Discussions.'

The keynote to Mill's method is found in the individualism which he inherited from the 18th century. This meant associationalism in logic and psychology, a metaphysical conception of reality as made up of separate phenomena, an ethical theory that made pleasure and pain the motives of action, *laissez faire* in political economy, and the political doctrine that the end of government is to protect each individual in the possession of the produce of his labor.

But in all these various fields he passed the bounds set by his inheritance. He was more concerned to find truth than to maintain a creed.

As *Logician,* Mill's greatest contribution was his treatment of induction. The four "methods" of agreement, difference, residues and concomitant variation had been mentioned by J. Herschel, but were by Mill first brought out clearly. In the part of his 'Logic' which deals with the nature and conditions of knowledge he attempts, with only partial success, to give logic a more vital relation to truth and fact than it had borne since Hobbes and Locke. He insists that propositions concern "things" not "ideas"; that there are "real kinds," not merely class names; that cause is not to be defined with Hume as "invariable antecedent" but as "unconditional antecedent" or "sum of conditions." But he does not see that this really implies a reconstructed view of nature, in which a conception of an interrelated system or whole should replace the conception of a mere sum of individuals or particulars. He remains true to his older presuppositions in holding that reasoning is from particular to particular, and that axioms owe their force to association. Matter, he holds, following Berkeley, is only permanent possibilities of sensation. In his view of the self, on the one hand, he considers that we can know only states of consciousness, that the law of association is the "governing principle," and that the conceptions by which knowledge is organized "are impressed upon the mind from without"; on the other hand he recognizes "the paradox, that something which, *ex hypothesi,* is but a series of feelings, can be aware of itself as a series." He therefore admits that "the mind, or ego, is something different from any series of feelings or possibilities of them." While, then, he holds to the doctrine of "circumstances" as determining character, he is careful to insist that this is not "necessity" in the ordinary sense; "our own desires can do much to shape those circumstances."

As *Economist,* Mill attempted to follow the general plan of Adam Smith and give the science a more concrete form than it had received at the hands of Ricardo; to treat it not merely as an abstract science of the "economic man," but as "branch of social philosophy, so interlinked with all the other branches that its conclusions are only true conditionally." The current economists had aroused the antagonism of the working classes. Mathusianism held out a grim prospect of increasing stress with increase of population. Ricardo's presentation of the laws of wages seemed to condemn as absolutely futile all effort to raise wages, whether by voluntary association or by political action. The repeal of the corn laws would, it was feared, ultimately benefit the employers instead of the employed. Mill retained the Mathusian doctrine as one of his cornerstones. He sees hope for the laboring classes only if they will restrict their offspring and thus diminish the supply of labor. He retains also the doctrine that labor is supported by capital, and in his 'Political Economy' speaks of a "wage fund." But as an ardent sympathizer with the working class Mill makes various concessions and suggestions which made his work far less a "dismal science." 'Political Economy' "has no pretension to the character of a practical guide, apart from other classes of consideration." While the laws of the production of wealth are "real laws of nature," the modes of its distribution, "subject to certain conditions, depend on human will." The "existing arrangements of society" have much to do with determining what shares fall to laborers, capitalists and landlords, and these arrangements may be altered "by the progress of social improvement." At first he thought only of getting rid of primogeniture and entails, and of promoting restraint of population by general education. He later came to look for a great advance in coöperation, and in the character which this implies. In 1869 he definitely retracted the "wage-fund doctrine, recognizing that there is a considerable range in the wage which economic conditions allow and hence that trades-unions may raise wages to a certain extent." In his last years he was especially impressed with the injustice of the places which the land owners occupy at "Malthus's feast." "Land alone has the privilege of steadily rising in value from natural causes." The "unearned increment" should be not for the private owner but for the nation. He differed from more complete Socialists in retaining competition in his scheme, and insisting that the associations for coöperation must be voluntary. He regarded the problem of the future to be "how to unite the greatest individual liberty of action, with a common ownership in the raw material of the globe, and an equal participation of all in the benefits of combined labor."

His moral and political theories are set forth in his 'Utilitarianism,' 'Liberty,' and 'Subjection of Women.' He always remained a Utilitarian in the sense that he believed "those actions right which promote the greatest happiness of the greatest number"; further, he attempted to prove this by the individualistic doctrine that since each one desires his own happiness, the general happiness must be a good, not noticing the possible conflict between such happiness-seeking in individuals, which would make a "sum" impossible. But elsewhere he breaks away decisively from Bentham's doctrine that happiness means only pleasure of varying intensity, length, certainty, etc., regardless of what objects produce it. "Higher pleasure," a "sense of dignity," will not be exchanged for any amount of the "lower" by the expert judge. It is "better to be Socrates dissatisfied than a pig satisfied." This is evidently abandoning pleasure pure and simple as standard, and setting up instead a "standard for pleasure," namely, the character of the man who judges. In the 'Liberty' he states that the utility which is the ultimate appeal "must be utility in the largest sense, grounded on the permanent interests of man as a progressive being." The motives on which he relies are not the external "sanctions" of Bentham; nor yet the association of private with public happiness which James Mill had regarded as the structure of conscience. These suddenly appeared to him artificial. Partly under the influence of Comte he came to hold, rather, that conscientious regard for others is supported by natural social instincts. His 'Liberty,' the most carefully written of his works, contains a fresh and vigorous argument for the principle that only self-protection — to prevent harm to others — justifies society in interfering with the individual's liberty of action. "His own good is not a sufficient warrant." The positive reason for this is the great value of individuality in human welfare. The principle requires not only liberty from legal restraint, but from the coercion of public opinion. It comprises, first, liberty of thought and discussion, in order that truth may be reached; secondly, liberty of tastes and pursuits; thirdly, freedom to unite for any purpose, not involving harm to others. In the 'Subjection of Women' he argues for the complete legal equality of men and women, not only to remove injustice but because "the only school of genuine moral sentiment is society between equals." "We have had the morality of submission, and the morality of chivalry and generosity; the time is now come for the morality of justice." Moreover, a position of equality with its accompanying effects of enlarged interests, wider responsibility, greater dignity, and the possibility of individual development and satisfactions would add immeasurably to the well being of all other members of the family.

Mill's religious views are found chiefly in the 'Examination of Sir William Hamilton' and in the three essays published after his death. He found no warrant for making nature a standard of morals or for inferring from it perfect benevolence or justice. Indeed only by sacrificing the attribute of omnipotence can we reconcile nature with the existence of a moral deity. In all this he is considering the older deistic conceptions, nature, man, and God, as three separate beings. But there is much in his thought which is incompatible with such mechanical separation of nature and spirit, and of human and divine, notably in the famous passage from the 'Examination.' In reply to Dean Mansel's mode of reconciling supposed divine action with human conceptions of justice by the doctrine that God is Inconceivable, and therefore what is wrong by human standards may be right by divine standards, Mill replies, "I will call no being good, who is not what I mean when I apply that epithet to my fellow creatures; and if such a being can sentence me to hell for not so calling him, to hell I will go."

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Mill, the general name of a machine for grinding, crushing, or pulverizing. Also a lapidary's grinding wheel, known as roughing mill. Also a machine, or complication of engines or machinery, for working up raw material; as, a cotton mill, a spinning mill, a saw mill, an oil mill, etc. In die-sinking, the hardened steel roller having the design in cameo, and used for impressing in intaglio a plate, as in the banknote system of engraving; or a copper cylinder, as in the process of engraving cylinders for calico printing.

Mill Springs, Ky., village in Wayne County; on the Cumberland River; about 90 miles south of Frankfort. It has steamer connections with places on the Cumberland and Ohio rivers. A battle was fought here on 19 Jan. 1862, between the Federal and Confederate forces. (See Mill Springs, Battle of.) A National cemetery located here contains 718 graves of soldiers.

Mill Springs, Battle of. The opening of the Kentucky-Tennessee campaign of 1862. At the close of 1861 the Confederate line extended from Columbus, Ky., on the Mississippi, through Fort Henry on the Tennessee, Fort Donelson on the Cumberland, Clarksville, Tenn., and Bowling Green, Ky., to Mill Springs on the Cumberland. Gen. A. S. Johnston was in chief command. Gen. D. C. Buell was the opposing Union commander. Gen. F. K. Zollicoffer established the Confederate right at Mill Springs early in December. Gen. Geo. B. Crittenden took general command there at the middle of the month, with the brigades of Zollicoffer and W. H. Carroll under him. Gen. Leonidas Polk held the Confederate left at Columbus, Gen. J. B. Floyd reached Fort Donelson 13 February, and had under him Gens. Pillow, Buckner, and Bushrod Johnson. Gen. A. S. Johnston was at Bowling Green, the centre. Gen. Geo. H. Thomas was on the Union left, with Gen. Schoepf immediately opposed to Zollicoffer, while Gen. Buell, with headquarters at Louisville, was in close communication with the Union centre, which threatened Bowling Green and Nashville.

Gen. Zollicoffer, having crossed from Mill Springs to the north bank of the Cumberland and intrenched his position, from which he threatened central Kentucky, Gen Thomas was sent against his forces, now commanded by Gen. Crittenden, from the direction of Lebanon. On 18 January Gen. Thomas reached Logan's Cross Roads about 10 miles from Crittenden's intrenchments. The latter officer, with the purpose of attacking before Thomas could concentrate his forces, marched at midnight of the 18th with Zollicoffer's and Carroll's brigades, consisting of eight regiments of infantry, six guns, and four battalions of calvary, and attacked Gen. Thomas soon after daylight of 19 January.

The Union troops, consisting of six infantry regiments, one battery, and a portion of a cavalry regiment, were brought rapidly into action, both sides fighting with spirit. Finally, when three fresh Union regiments fell on the Confederate right, and the 2d Minnesota was pouring a galling fire upon the centre, the 9th Ohio (German Turners) made a brilliant bayonet charge completely turning the Confederate left, resulting in the Confederate lines breaking and retiring in confusion. At this point Gen. Schoepf's brigade from Somerset reached the field, and the whole force continued in pursuit, reaching the Confederate intrenchments during the night, and forming to assault them at daylight. During the night the Confederates succeeded in crossing their men, leaving artillery, cavalry, horses, mules, wagons, camp equipage and private baggage. The Confederate right wing was effectually broken and largely dispersed.

The overthrow of the Confederate right was followed 6 February by the capture by Admiral Foote, acting in co-operation with Gen. Grant, of Fort Henry on the Tennessee, and 16 February by the capture of Fort Donelson, with its artillery and garrison of about 15,000, by Gen. Grant.

On 8 February Gen. Johnston notified the Secretary of War that the loss of Fort Henry and the movement against Fort Donelson made the Bowling Green line untenable, and that he had directed Gen. Hardee at Bowling Green to prepare to fall back on Nashville. The evacuation was completed 14 February, and by the 17th Gen. Hardee had crossed the Cumberland at Nashville and proceeded toward Murfreesboro. Ten days later, all army supplies having been sent to Chattanooga, which place was held by troops sent by Gen. Bragg from Mobile, Johnston's army marched for the line of the Memphis & Charleston Railroad at Decatur, this line having been decided upon as the next for defense.

By the last of March Johnston's column had taken position at Corinth, Bragg's forces had reached him from Mobile, and a portion of Polk's from Columbus.

Meantime (15 February) Bowling Green was occupied by Union forces under O. M. Mitchel. Pressing on, he reached Edgefield opposite Nashville on the 14th. Nelson's division arrived by transports the next day, and soon after the first of March Buell's entire column, coming partly by land and in part by river, was concentrated at Nashville.

The Union movement to Pittsburg Landing began 10 March by the despatch of Gen. W. T. Sherman's division from Paducah up the Tennessee. It proceeded, under orders of Gen. C. F. Smith, to the vicinity of Eastport; but finding all streams inland at flood, the expedition dropped back to Pittsburg Landing, where it found Hurlbut's division. The latter took post 1½ miles back 18 February, and Sherman's the next day about three miles, back, at Shiloh Church. These were followed within a few days by the divisions of Prentiss, McClernand and W. H. H. Wallace, each selecting its own camp without special reference to a general line, the movement being regarded as a concentration preparatory to an advance on Corinth. Gen. Lew Wallace's division was halted at Crump's Landing, five miles below Pittsburg. Gen. Grant arrived and assumed command 17 March, establishing his headquarters at Savannah nine miles below, on the opposite side of the Tennessee.

Gen. Buell's advance left Nashville 15 March to join Gen. Grant at Savannah. After marching 130 miles in nine days he was stopped by high water in Duck River, necessitating bridging, and then marched the remaining 90 miles in six days. Gen. Grant had advised him that it was not necessary to hurry, as he would not be ready to cross his command over the river till 8 April. However, Buell pushed on and fortunately reached Savannah with the head of his column the night of the 5th. Gen. Johnston with the design of attacking Grant before Buell could join him, had marched from Corinth 3d April, with the expectation of attacking on the 5th, but heavy rains delayed his columns, and his unexpected attack was delivered soon after daylight of 6 April, thus opening the battle of Shiloh or Pittsburg Landing. See SHILOH, BATTLE OF.

H. V. BOYNTON.

Millais, mĭl-lā', SIR **John Everett**, English painter: b. Southampton, England, 8 June 1829; d. London 13 Aug. 1896. His earliest years were spent in Jersey and at Dinan in France, and at the age of eight, he was sent to study art under Mr. Sass. In 1840 he became a student in the Royal Academy, and in 1846 he exhibited his 'Pizarro seizing the Inca of Peru.' Next year the gold medal of the Academy was awarded to his 'Young Men of Benjamin seizing their Brides.' In 1848, along with Holman Hunt, Dante G. Rossetti, and others, he founded the Pre-Raphaelite Brotherhood. Among the chief works of this period are 'A Huguenot,' 'The Order of Release,' and the 'Proscribed Royalist.' In 1853 he was elected an associate of the Royal Academy, and ten years later Academician. For a few years thereafter his pictures were still influenced by the Pre-Raphaelite principles, which he gradually shook himself clear of. He developed into a splendid colorist, a master of technique, and altogether a great modern master. Numerous honors fell to him; he was decorated with the Legion of Honor in 1878, elected a member of the Académie des Beaux-Arts in 1882, created a baronet in 1885, and elected to succeed Lord Leighton as President of the Royal Academy in 1896; but he only held this last position about six months, dying on 13 August of the same year. He was most successful in figure-pieces and portraits, but he also produced a certain number of landscapes, one of the finest being 'Chill October' (1871). He painted portraits of some of the foremost men of the day, including Mr. Gladstone, Lord Beaconsfield, Lord Salisbury, Mr. Ruskin, Lord Tennyson, and others.

Millard, mĭl'ạrd, **Evelyn**, English actress: b. London. After a private education, she made her first appearance in 1891 in a stock company at Margate. Among her parts are Polly Fletcher in 'The Lost Paradise'; Princess Flavia in 'The Prisoner of Zenda'; Portia in Beerbohm Tree's production of 'Julius Cæsar' in 1898; and Miss Hobbs in J. K. Jerome's comedy of that name.

Mill'bank Prison, or **The Penitentiary**, a famous London house of detention, demolished in 1891. It was situated in the parish of St. John's, Westminster, facing the Thames, and was erected at an enormous cost to carry out the plans of the philanthropists Howard and Bentham. The building was commenced in 1812, and completed in 1821. It had accommodation for 1,100 prisoners. The prison ceased to be a convict establishment in May 1886.

Millboard, in bookbinding, a pasteboard made of strong materials, used for the stiff portion of book covers. It is also used for packing between the flanges of pipes, being previously soaked in oil.

Millbury, mĭl'bŭ-rĭ, Mass., town in Worcester County; on the Blackstone River, and on the Boston & A. and the New York, N. H. & H. R.R.'s; about five miles southeast of Worcester.

it was settled in 1743 and was called North Parish of Sutton until 1813 when it was incorporated. It is claimed as the place where the «Lyceum Lecture System» originated in 1820. It is a manufacturing town; the chief industrial establishments are foundries, machine-shops, linen cloth factory, woolen mills, thread factories, hosiery mills, lumber mills, weaving machinery, and cotton mills. Pop. (1890) 4,428; (1900) 4,460; (1910) 4,740.

Milledge, mĭl'ĕj, **John,** American soldier and politician: b. Savannah, Ga., 1757; d. 9 Feb. 1818. At the outbreak of the Revolution he was one of the party which, led by Joseph Habersham, made a prisoner of Wright, the royal governor, 17 June 1775, the first bold revolutionary act performed in Georgia. When Savannah was taken by the British, Milledge escaped to South Carolina, where he was captured by a party of Americans, and came near being hanged as a spy. In 1779 he was present at the unsuccessful siege of Savannah. He was also at the siege of Augusta, and in South Carolina and Georgia, at various places, did valuable service in the patriot army. In 1780 he was appointed attorney-general of Georgia, and afterward served frequently in the State legislature. In 1802 he was elected governor of Georgia, and served two terms. He was a representative in Congress from 1792 to 1802, except one term, and United States senator from 1806 to 1809. Milledge was the principal founder of the University of Georgia, and purchased and presented a tract of land which is the site of the university and of a part of Athens, its seat. See MILLEDGEVILLE.

Milledgeville, mĭl'ĕj-vĭl, Ga., city, county-seat of Baldwin County; on the Oconee River, and on the Georgia and the Central of G. R.R.'s; about 30 miles northeast of Macon. It is near the geographical centre of the State; and streams nearby furnish natural drainage and water-power. The dam on the Oconee increases the water-power. The place was settled in 1803, received its city charter in 1836, and was named in honor of John Milledge (q.v.). From 1807 to 1867 it was the capital of the State. It is in a fertile agricultural region in which cotton, corn, wheat, hay, and fruits are the chief products. In the vicinity are fine deposits of talc, kaolin, and fire-clay. Ornamental and building brick are manufactured extensively and quantities of clay are shipped to other places. The preparation of cotton for the markets is a most important industry. The building which was once the State capitol is now the Georgia Military College, a school which, in 1903, had in attendance 500 students. Other institutions are the Georgia Normal and Industrial College, a State School for Girls, and the State Sanitarium for the Insane. The State Prison farm is just outside the city limits. The government is administered under a charter of 1900 and is vested in a mayor who holds office two years, and a council. The mayor is a member of the council. Pop. (1910) 4,385.

Millena'rians. See MILLENNIUM.

Mill'enary Petition, in English history, a petition named from the number of signatures appended to it presented by the Puritans to James I., in 1603. The petitioners desired to be relieved from the use of the sign of the cross in baptism, the ring in the marriage service, confirmation, and bowing at the name of Jesus. The petition in reality contained only 750 names, instead of 1,000.

Millennium (Lat. *mille,* 1,000, and *annus,* a year), a period of 1,000 years. Hence it is a term applied to the period during which, according to some, Jesus Christ will return to reign on earth before the end of the world. This premillennial appearance of Christ will be signalized by a first or particular resurrection of the just, who are to reign with Him on earth, and by the destruction of Antichrist. Those who hold such views are called millenarians or chiliasts, and their tenet chiliasm (Gr. Χίλιοι, 1,000). It is admitted on all sides that these views were, if not general, at least very common in the ancient church. The belief was generally founded on Ps. xc. 4, according to which 1,000 years are before the Lord as one day, compared with the account of the creation as given by Moses. The six days of creation are taken as designating 6,000 years of toil, and the subsequent sabbath as designating 1,000 years of rest and happiness. The millennium was to be the sabbath rest of the new creation of mankind in Christ. Besides these passages, Rev. xxi. 1–6 is especially quoted by chiliasts in support of their views. Chiliasm prevailed chiefly among the Jewish Christians, who retained after their conversion the hope that they would rule over all other nations under a royal Messiah (q.v.). The Ebionites, the Nazarenes, and Cerinthians all advocated it; and Montanus, and the sect which was called after him, regarded it as a fundamental doctrine of the Christian religion. Some early fathers of the church also declared themselves generally in favor of the doctrine; Papias, Irenæus, and Tertullian were chiliasts; and Papias appealed in support of his view to apostolic traditions. On the other hand, however, the epistles of Clement of Rome and Ignatius of Antioch, are silent about it. Justin Martyr who wrote in the second century was a believer in the millennium. «I and all Christians whose belief is in every respect correct,» he says, «know that there will be both a resurrection of the flesh and a thousand years in Jerusalem, which will then be rebuilt, adorned and enlarged, as the prophets Ezekiel, Isaiah and others declare.» This view was opposed by the whole Alexandrian school, especially by Origen, who believed in a spiritual supramundane interpretation of Revelations. Still it continued to find advocates during the 3d century, among whom Tertullian, Nepos, bishop of Arsinoe, and Methodius, bishop of Tyre, were prominent. In the 4th century, Jerome, who did not believe in it himself, did not dare to condemn it, in consideration of the many pious and learned advocates it had found in former centuries. Soon after it began to die out; it was temporarily revived toward the close of the 10th century, by the popular belief in the approaching end of the world, but it never regained great strength. The reformation of the 16th century gave a new impulse to chiliasm. Fanatical opinion identified the pope with Antichrist, and regarded the anticipated downfall of the Roman Catholic Church as foreshadowing the approach of the millennium. But when the Anabaptists undertook in 1534 to erect the new Zion, both the Lutheran and Reformed churches declared themselves against this reversion of the old doctrine. Yet it was preached by many sectarians and theologians of the 16th and 17th centuries, among whom were Weigel and the Moravian bishop Comenius in Germany, Jurieu in France, the Labadists in the Netherlands, and Joseph Mede and Jane Lead (died 1704) in England. A third period in the history of chiliasm may be commenced with the writings of the esteemed exegete and New Testament commentator, Johann Albrecht Bengel. He practically reintroduced it into Protestant theology, where it has ever since been advocated by a number of prominent theologians. The ingenious prelate Oetinger (d. 1782) brought it into connection with his favorite theosophic views. Hahn (the founder of a pietistic sect in Würtemberg), Stilling, Lavater, and Hass gave it a wide circulation among the lower classes of the people in Germany and Switzerland. In opposition to the "spiritualism" of modern exegesis, it was advocated, with exegetical arguments, by Hoffmann, Delitzsch, Kurtz, Hebart, and others; while Thiersch, Nitzsch, P. Lange, and Ebrard supported it from a dogmatical as well as an exegetical standpoint. Swedenborg taught that the last judgment took place in 1757, and that the New Church or church of the New Jerusalem had actually been formed both in heaven and on earth. After Germany, England and America have been the chief fields of modern chiliasm. The "Catholic Apostolic Church," organized by Edward Irving, laid great stress on the belief that the kingdom of glory was very near. Chiliasm lies at the foundation of Mormonism, whose adherents call themselves "Latter Day Saints" in reference to the near approach of the last day. In the United States great excitement was caused by the preaching of William Miller (q.v.), who sought to prove from the Scriptures that the second advent of Christ would take place about 1843. He not only met with numerous chiliasts in most denominations, but he also founded the sect of Adventists (q.v.). Chiliasm has been seriously taken in declarations of doctrine formulated by several churches. The Augsburg Confession implicitly repudiates it, speaking of "the last days foreshown in Holy Scripture, in which the world is to become ever more and more degenerate and mankind more sinful and weak." The Council of Trent declares that "the Scriptures also inform us that the General Judgment shall be preceded by the preaching of the Gospel throughout the world, a defection from the faith and the coming of Antichrist." There is a sort of millennium also looked forward to by those who disbelieve in religion as the renovator of the world. According to these teachers there is a material millennium quite within the range of future possibilities. They teach that the race must look to its renewal and improvement by the non-propagation of disease and impotency of every nature, and to the persistent and joyous multiplication of the best elements of our race, in a continual progress toward the Hierarchy of Life. The millennium, according to this newly invented philosophy, will come by natural and not supernatural means.

Consult: Luthardt, 'Lehre von den letzten Dingen' (1870); Seiss, 'The Last Times' (1878); Salmond, 'Christian Doctrine of Immortality' (1897); Terry, 'Biblical Apocalyptics' (1898). See ESCHATOLOGY; JUDGMENT, FINAL; RESURRECTION.

Mil'lepede, a myriapod of the *Chilognatha*, the second order of the class *Myriapoda*, in which each segment of the body, except a few of the front joints, bears two pairs of legs — the joints in the nearly-related centipedes (q.v.) bearing each one pair only. The common species (genus *Julus*) are found in damp places, concealed under stones, or under the bark of trees. The body consists of from forty to fifty joints, protected by a horny skin, and when irritated or at rest, these animals coil up for protection. The mouth is provided with a pair of strong jaws or "mandibles"; and the antennæ or feelers consist of six or seven joints. See MYRIAPODA.

Mil'lepore, family (*Milleporidæ*) of *Hydrozoa*, remarkable for secreting massive calcareous skeletons like corals, with which they were for a long time classed. The hydranths are of two kinds: gastrozoids, or feeding polyps, which provide nourishment for the colony, and dactylozoids, which are elongated, mouthless, protective polyps provided with large numbers of nematocysts (q.v.). The generative cells are remarkable for their wanderings through the tissues of the polyps and colonies. The colonies are hermaphrodite, but the related family *Stylasteridæ* has unisexual colonies. They live in warm seas and form reefs in shallow waters. *Millepora alcicornis* is abundant near low water in the West Indies, where representatives of the *Stylasteridæ* also occur in deep water.

Miller, Alfred Brashear, American Presbyterian clergyman and educator: b. Brownsville, Pa., 16 Oct. 1829; d. Waynesburg, Pa., 20 Jan. 1902. After obtaining his preparatory education in various schools, he graduated from Waynesburg College in 1853, becoming professor of mathematics there, and remaining in that position until 1858. In 1859 he became president of the college and served as such till 1899 when he became president emeritus. He was for 10 years pastor of the Cumberland Presbyterian church at Waynesburg and also edited the 'Cumberland Presbyterian' (1864–8). He published 'Doctrines and Genius of the Cumberland Presbyterian Church' (1892).

Mil'ler, Anna Jenness, American author and lecturer: b. New Hampshire. She is most widely known as an advocate of correct principles of physical development and dress for women; she is also interested in the æsthetic side of life, and is a student of art and a collector or paintings and curios. She was for many years editor and proprietor of the 'Jenness Miller Monthly,' in which she advocated her views; and has given over 1,000 lectures in the United States and Canada on physical culture and dress. She has also designed a costume for women which she claims fulfils the requirements of both hygiene and art. She has published 'Barbara Thayer' (1884); 'Twixt Love and Law'; 'Mother and Babe' (1892) 'How to Finish and Furnish a Home' (1892); 'Creating a Home' (1896); 'Physical Beauty'; and 'Philosopher of Driftwood.'

Miller, Alfred Jacob, American painter: b. Baltimore, Md., 1810; d. 1874. He studied under Thomas Sully, and in Europe, where he made successful copies of the old masters. Accompanying Sir William Drummond Stewart to the Rocky Mountains, he painted many striking pictures of the scenery, which are now in Murthley Castle, Scotland. He also executed numerous portraits.

Miller, Charles Henry, American landscape painter: b. New York 20 March 1842. He was educated in medicine at the New York Homœopathic College and subsequently studied art at the Royal Academy of Bavaria in Munich. In 1873 he became an associate of the National Academy of Design and an Academician in 1875. He is especially noted for his studies of Long Island scenery and has exhibited at very many important national and international exhibitions. Among his works may be cited 'Autumn at Creedmoor Oaks'; 'A Grey Day on Long Island'; 'Moonlight near Great South Bay'; 'Long Island Meadows'; 'A Frosty Day on Long Island'; 'The Springfield Mill Pond.' He has published under the signature of «Carl de Muldor,» 'The Philosophy of Art in America' (1885).

Miller, Charles Ransom, American journalist: b. Hanover, N. H., 17 Jan. 1849. He was graduated from Dartmouth College in 1872 and became a journalist. In 1872-5 he was with the Springfield *Republican* and since then has been on the staff of the New York *Times,* where he was editorial writer in 1881-3 and is now editor-in-chief.

Miller, Cincinnatus Heine, better known as «JOAQUIN MILLER,» American poet, whose pseudonym is due to his defense of Joaquin Murietta, a Mexican bandit: b. Wabash district, Ind., 10 Nov. 1841. His father took him to Oregon in 1854. He got a little schooling but soon ran away from home; went to the California gold mines; accompanied Walker on the Nicaragua filibustering expedition; lived familiarly among the Indians and the Spaniards of the Pacific slope; studied law for a few years, having graduated at Columbia College, Oregon, in 1858; practised law unsuccessfully in Idaho, where he soon turned express messenger, and in 1863 settled in Oregon for a short time, becoming editor of the Eugene City *Democratic Register,* which was suppressed in the same year because of its treasonable character. In 1864 he began to practise law in Cañon City, Ore., made himself popular by his services against the warlike Snake Indians, and from 1866 to 1870 was judge of Grant County. His writings collected under the title 'Songs of the Sierras' he could not sell in the East, and so took them to London, where they were published and brought him great fame. He visited London again in 1873; lived in Washington, D. C.; and in 1887 returned to California, settling near Oakland. His life sums up the adventure of the Pacific slope, and his verse and fiction are to be prized especially on this account as being real «documents» of certain phases of American life. They are, moreover, fresh, vigorous, and original in style; his metre is free and powerful; and his narrative forcible. He excels, perhaps, in his pictures of Nature. In a few short lyrics there is a quiet melancholy, bred of communion with solitary wood and mountain. But on the whole he is not a great artist, although his work has a distinct value as descriptive of various American types. Hence his fame has been much greater in England, where he was even styled «the American Byron,» than in America. Miller's verse includes: 'Songs of the Sunlands' (1873); 'Songs of the Desert' (1875); 'Songs of Italy' (1878); 'Collected Poems' (1882); and 'Songs of Mexican Seas' (1887). His prose works are: 'The Baroness of New York' (1877); 'The Danites in the Sierras' (1881; later in the form of a play); and '49, or the Gold-Seekers of the Sierras' (1884).

Miller, Emily Huntington, American author and educator: b. Brooklyn, Conn., 22 Oct. 1833. She was graduated from Oberlin College, Ohio, in 1857, and was married to J. E. Miller (d. 1882) in 1860. She was editor of a juvenile magazine, 'The Little Corporal,' afterward merged in 'St. Nicholas,' and in 1891-8 was dean of the Woman's College of Northwestern University. She has written: 'From Avalon and Other Poems' (1896); 'Fighting the Enemy'; 'Helps and Hindrances'; 'Songs from the Just'; etc.

Miller, Florence Fenwick, English doctor, lecturer and author: b. 5 Nov. 1854. She entered the Ladies' Medical College, London, in 1871; gained a wide practice and did much charity work; was thrice a member of the London school board; and is a prominent advocate of women's suffrage. She married Frederick A. Ford in 1877, but kept her maiden name. She wrote: 'The House of Life' (1879); 'Physiology for Schools' (1880); 'Atlas of Anatomy' (1880); 'Readings in Social Economy' (1883); 'Life of Harriet Martineau' (1884); and 'In Ladies' Company' (1892), as well as letters over the signature «Filomena» for the London *News* and for various provincial papers.

Miller, Harriet Mann («OLIVE THORNE MILLER»), American ornithological writer: b. Auburn, N. Y., 25 June 1831. Her earliest writings were signed «Olive Thorne,» and after her marriage to W. T. Miller in 1849 she added her husband's name to her signature. She began her study of birds in 1880 and has published for young people's reading: 'Little Folks in Feathers and Fur' (1879); 'Little People of Asia' (1882); 'In Nesting Time' (1888); 'Little Brothers of the Air' (1892); 'A Bird-Lover in the West' (1894); 'Our Home Pets' (1894); 'Four Handed Folk' (1896); 'Under the Tree Tops' (1897); 'The First Book of Birds' (1899); etc.

Miller, Hugh, Scottish geologist and author: b. Cromarty 10 Oct. 1802; d. Portobello, near Edinburgh, 23 Dec. 1856. When five years old he lost his father, a seaman, and thus came under the care of his mother and her two brothers, who were unable to keep him in school, so fond was he of out-door life, of unrestrained reading, and of composition. That he might have the winter months free to write in, it is said, he became a stonemason. At this trade he worked from 1819 to 1834; gained some literary repute in the meantime, especially by letters to the 'Inverness Courier' on the herring fishery; in 1834 became accountant in the bank at Cromarty; wrote 'Scenes and Legends of the North of Scotland' (1836); and gradually became known for his knowledge of geology, to which he had first been drawn by noting the ripple marks on a block he was handling in the stonecutters' yard. 'Old Red Sandstone or New Walks in Old Fields' (1842) made Miller famous, and the Old Red Sandstone became freshly important to the geologist. Miller was a devout Christian, a promoter of the «Free Church,» and intensely orthodox in his opinions. Hence he opposed the doctrine of development advanced in the anonymous 'Vestiges of Creation,' and in 1847 published 'Footprints of the Creator,' to which 'The Testimony of the Rocks' (1857) formed a sort of sequel. In these books Miller held that, while the Bible is not a scientific text-book and should not be so regarded, yet it is not contradicted by science. In particular he urged that the narrative of a six-day creation was entirely consonant with modern geological discovery; indeed he divided into six eras, to correspond with these six "days," all of geological history. His interest in the Free Church movement prompted him in 1839 to write 'A Letter to Lord Brougham' and 'The Whiggism of the Old School,' in which he protested against forcing clergy on the Scotch churches. Both pamphlets were so forceful that their author in 1840 was made editor of the 'Witness,' an Edinburgh bi-weekly devoted to ecclesiastical independence. This post he held for nearly 17 years, while his health gradually broke under the stonemason's disease contracted years before; at the same time his mind suddenly failed, and in a moment of aberration he shot himself. Miller's present vogue is due to his admirable, simple and fascinating style. As a scientist he did, it is true, urge the doctrine of specific creation, and emphasize the complete definiteness of demarkation between strata of various geological series and the catastrophic nature of the change from one era to another; but these views were not reactionary at the time, being held by other scientists with far wider and deeper training than Miller. His common sense and native sagacity led him to the correct solution of many minor concrete problems in geology; and his books popularized the study of that science. Consult: Miller's famous autobiography, 'My Schools and Schoolmasters' (1852); Bayne, 'Life and Letters of Hugh Miller' (1871); a memoir by Agassiz in the later American editions of 'Footprints of the Creator'; and Brown, 'Labour and Triumph' (1858).

Miller, James, American soldier and politician: b. Peterboro, N. H., 25 April 1776; d. Temple, N. H., 7 July 1851. He was educated for the bar, but entered the army as major in 1808, and distinguished himself on the northern frontier. In 1812 he was brevetted colonel for gallantry as commander at Brownstown, and in the following year participated with credit in the capture of Fort George. In 1814, as colonel of the 21st infantry, he accompanied the invading army into Canada, and fought with gallantry at the battles of Chippewa and Lundy's Lane (qq.v.), the success of the Americans in the latter conflict being mainly due to his capture of a British battery. For these services he was made brigadier-general, and received from Congress a gold medal. In 1819 he resigned his commission in the army, and from that year until 1825 served as governor of the Territory of Arkansas. He was collector of the port of Salem, Mass., from 1825 to 1849, when he retired to private life.

Miller, James Russell, American Presbyterian clergyman and author: b. Harshaville, Pa., 20 March 1840. He was graduated from Westminster College, New Willmington, Pa., in 1862 and has held several important pastorates. He is editor of the Presbyterian Board of Publication and among his very numerous books are: 'Week-Day Religion' (1880); 'The Marriage Altar' (1888); 'Building of Character' (1894); 'To-day and To-morrow' (1902); 'In Perfect Peace' (1902); etc.

Miller, Joaquin. See MILLER, CINCINNATUS HEINE.

Miller, John Franklin, American soldier: b. South Bend, Ind., 21 Nov. 1831; d. Washington, D. C., 8 March 1886. He was graduated from the New York State Law School in 1852 and established a practice at South Bend, and took a leading part in State politics. In 1860 he was elected State senator, but resigned to enter the army the next year. He was in active service from almost the beginning, and in the battle at Stone River he performed services which led to his promotion to the rank of brigadier-general. He resigned at the close of the war though offered a commission as colonel in the regular army, and removed to California, where he for a time practised law and then entered a business life. He continued an active interest in politics, and from 1881 until his death was United States Senator.

Miller, Joseph. See JOE MILLER.

Miller, Joseph Nelson, American naval officer: b. Ohio 22 Nov. 1836; d. Brick Church, N. J., 26 April 1909. He entered the navy in 1851, in 1861 had risen to the rank of lieutenant, and was promoted lieutenant commander in 1862. As executive officer of the Passaic he had part in the attack upon Fort McAllister and Fort Sumter, and in the two attacks upon Fort Fisher as executive officer of the Monadnock; and received commendation from his commanding officers for bravery and skill in these engagements. In 1870 he was promoted to the rank of commander, and in 1875 was assigned to the Tuscarora, and had charge of the deep sea soundings between the Hawaiian and the Fiji Islands. He obtained the rank of captain in 1881, commodore in 1894, and rear-admiral in 1897. In the latter year as commander-in-chief of the Pacific stations he hoisted the American flag at Honolulu, and in 1898 again raised the flag there, when American sovereignty of Hawaii was established. In 1897 he was the representative of the United States Navy at Queen Victoria's Jubilee, with the Brooklyn as flagship; and during the Spanish War (1898) he organized the naval reserves on the Pacific coast. He was retired from active service in November 1898.

Miller, Lewis, American inventor and philanthropist: b. Greentown, Ohio, 1829; d. New York 17 Feb. 1899. He was a machinist, settled at Canton, Ohio, where he made agricultural tools, many of them after his own designs, notably the first successful reapers and binders; and later had factories at Akron and Mansfield. In Akron he built a model Sunday School, and he gave much money for Sunday School work throughout the country. He planned the Chautauqua Assembly and was its president from 1874 until his death.

Miller, Merrill, American naval officer: b. Ohio. He was appointed to the United States Naval Academy in 1859 and upon the outbreak of the Civil War was assigned to active duty. He was in the Mississippi squadron in 1862–3, was at the battles of Arkansas Post, Haines' Bluff, the siege of Vicksburg, and in 1864–5 was with the North Atlantic squadron. He continued in the navy after the war in different stations, was promoted captain in 1893, and since 1897 has been in command of United States receiving-ship Vermont.

Miller, Olive Thorne. See Miller, Harriet (Mann).

Miller, Patrick, Scottish pioneer in steam navigation: b. Glasgow 1731; d. Dalswinton, Dumfriesshire, 9 Dec. 1815. He was engaged in business as a banker in Edinburgh, and was a leading stockholder in the Carron Iron Company, in whose shops carronades were first manufactured and from which they derived their name. In 1785 he purchased the estate of Dalswinton in Dumfriesshire, and here spent the latter part of his life, devoting his attention to agriculture (he introduced fiorin grass, or white bent, into Scotland, and wrote a treatise on it), and to experiments in ship-building. On 14 Oct. 1788 he first demonstrated the possibility of steam navigation by sailing a steam-propelled boat, 25 feet long and 7 broad, on the lake near his house. Miller had Robert Burns at one time as his tenant and correspondent. Consult: Woodcroft, 'Steam Navigation' (1848).

Miller, Warner, American manufacturer and politician: b. Oswego County, N. Y., 12 Aug. 1838. He was graduated from Union College in 1860; and for a year was professor of Greek and Latin at the Fort Edward Collegiate Institute. In the Civil War he served in the Fifth New York cavalry, enlisting as a private, and attaining the rank of lieutenant; he fought under Sheridan, and was taken prisoner at the battle of Winchester, was paroled on the field, and afterward honorably discharged. After the war he established a paper manufacturing business, in which he has continued to hold large interests. He has also been an active member of the Republican party, was delegate to the National Convention in 1872, and was elected to the New York legislature in 1874; and was a member of Congress from 1879 to 1881. In 1881, when T. C. Platt (q.v.) resigned from the United States Senate, Miller was elected to fill the vacancy, serving as Senator till 1887; in 1888 he was nominated for governor of New York by the Republicans, but failed of election. Later he has been interested in the Nicaragua Canal project, and was president of the Nicaragua Canal Company.

Miller, William, American religious leader: b. Pittsfield, Mass., 5 Feb. 1782; d Low Hampton, Washington County, N. Y., 20 Dec. 1849. Most of his education he obtained through books procured by wood-chopping. He became a farmer at Poultney, Vt., in 1803, and in 1816 removed to Low Hampton, N. Y. In the War of 1812 he was captain of a company organized to protect the northern frontier. He was at first a student of Hume, Voltaire, Thomas Paine, and Ethan Allen, and an avowed deist; but afterward became a member of the Baptist Church at Low Hampton. After a prolonged study of the Bible, enlightened by no help excepting that of a concordance, he began in 1831 to preach the second advent of Christ. He was licensed as a preacher by the Church at Low Hampton, but was never ordained. For a time all pulpits except the Roman Catholic and Episcopalian welcomed him. He first set the time of the second coming as somewhere between 21 March 1843 and 21 March 1844, and on 14 March 1844 proclaimed it as near at hand. Months intervened, and then, in October, the faithful gathered in their assemblies. At the end of November they dispersed. Many of the Second Adventists, or Millerites, as they were sometimes called, affiliated with other sects, but about 50,000 remained under the direction of Miller, who, on 25 April 1845, called a convention by which a declaration of faith was adopted, and the name of "Adventist" selected for the sect, which increased in numbers, and is to-day divided among six branches. Miller assisted in establishing, in 1840, 'The Signs of the Times and Exposition of Prophecy,' later called the 'Advent Herald.' He published 'Evidence from Scripture and History of the Second Coming of Christ about the Year 1843 . . . in a Course of Lectures' (1842); a widely circulated 'Dream of the Last Day,' and other writings. Consult the biographies by Bliss (1853) and White (1875). See Adventists; Millennium.

Miller, William, English line engraver: b. Edinburgh 28 May 1796; d. Sheffield 20 Jan. 1882. He was educated in England and at the University of Edinburgh, and studied engraving at Edinburgh and also under George Cooke during a residence in London, after which he returned and settled in his native city. His work was much commended by R. W. Turner, and he engraved many plates after and in accordance with the suggestions of that painter. Of these the most important are: 'The Bass Rock in a Storm' (1826); 'Great Yarmouth' (1829); 'The Grand Canal, Venice' (1837); 'Modern Italy' (1839); 'The Bell Rock Lighthouse in a Storm' (1864); 'St. Michael's Mount' (1866). The chief features in his engravings are the remarkable skill with which he gives the tone and value of color effects in black and white; the boldness and freedom with the line is employed in expressing the movement and gloom of storm clouds, the transparent fluidity of tossing waves, and the glassy surface of still rivers.

Miller, William, Scottish poet: b. Bridgegate, Glasgow, August 1810; d. Glasgow 20 Aug. 1872. Uncertain health preventing his becoming a physician, he adopted the trade of wood-turning. He published 'Scottish Nursery Songs and Other Poems' (1863). One of his most popular poems is 'Wee Willie Winkie.'

Miller, William Henry Harrison, American jurist: b. Augusta, N. Y., 6 Sept. 1840. He was graduated from Hamilton College, Clinton, N. Y., in 1861 and in 1862 entered the army, serving through the war. He engaged in law practice in Fort Wayne, Ind., 1866–74; in 1874 removed to Indianapolis and formed a partnership with Benjamin Harrison, and under the latter's administration (1889–93) was attorney-general of the United States.

Miller, Fort, a former fortification on the site of the present village of Fort Miller, Washington County, N. Y.; on the Hudson River, 40 miles north of Albany.

Millerand, mēl-ē-rän̄, **Alexander,** French Socialist: b. Paris 10 Feb. 1859. He was educated at the Lycée Vanves and the Lycée Henri IV., was admitted to the bar in 1881, and in 1885 was elected to the Chamber of Deputies as a radical Socialist. Frequently re-elected, he became a leader of the parliamentary or opportunist Socialists, and in 1899 received the portfolio of commerce in the Waldeck-Rousseau cabinet. In this post he secured the passage of important laws for the benefit of workingmen. He became proprietor (1889) of *La Voix*, which journal he made largely a vehicle for his own opinions.

Miller's Tale of the Carpenter, The, one of Chaucer's ‘Canterbury Tales’ (1475). The source of the tale is unknown.

Miller's-thumb, the English name for a small spiny fresh-water goby (*Cottus gobio*), of which many species occur in Europe and elsewhere. They are frequently called «bullheads» (q.v.), but are different from the small American catfish so called.

Millersburg, mĭl'ėrz-bėrg, Ohio, village, county-seat of Holmes County; on Killbuck Creek, and on the Cleveland, A. & C. railroad; about 70 miles northeast of Columbus. It is a manufacturing village; its principal industrial establishments are flour and lumber mills, foundry, brick-yards, and machine-shops. In the vicinity are deposits of iron ore and bituminous coal. Pop. 2,000.

Millet, Aimé, ā-mā mē-lā, French sculptor: b. Paris 1816; d. there 14 Jan. 1891. He studied art under David d'Angers (see DAVID, PIERRE JEAN), and the architect Viollet-le-Duc (q.v.), applied himself first to painting, and exhibited a picture in the exhibition of 1842, toiling at the easel for 10 years with no success. He meanwhile had turned his attention to the plastic arts, and exhibited his first statue, a ‘Bacchante,’ in 1845. This was followed by his ‘Ariadne,’ now in the Luxembourg, a ‘Mercury’ and a statue of ‘Civic Justice’ for the mairie of the First Arrondissement, Paris; the statue of a ‘Young Girl’ for a monument in the cemetery of Montmartre, an ‘Apollo’ for the façade of the New Opera House, and a bronze statue of ‘Vercingetorix’ (1865). Among his portrait and personal works are the statues of Chateaubriand at St. Malo; of Denis Papin, at Blois; and numerous busts. His style has all the realism of modern French sculpture, combined with a certain theatrical demonstrativeness, a vividness of expression, pathetic, tragic or passionate. Consult Dumesnil, ‘Aimé Millet, Souvenirs Intimes’ (1891).

Millet, Francis Davis, American artist: b. Mattapoiset, Mass., 3 Nov. 1846. He was graduated at Harvard 1869, served in the Civil War, and subsequently studied at the Royal Academy of Antwerp (1871–2). He became member of the National Academy of Design (1885). He designed the decorations of Trinity Church, Boston, and those in many important buildings in New York, Chicago, and elsewhere. Among his best known paintings are: ‘At the Inn’ (Union League Club); ‘A Cosy Corner’ (Metropolitan Museum of Art); and ‘Between Two Fires’ (National Gallery of British Art, London). He served as newspaper correspondent for the London *Times* and ‘Harper's Weekly’ at Manila (1898); and has translated Tolstoi's ‘Sebastopol.’

Millet, Jean François, zhŏṅ frāṅ-swā mē-lā, French painter: b. Gruchy, near Cherbourg, 4 Oct. 1814; d. Barbizon 20 Jan. 1874. He was educated in the Academy of Design at Cherbourg, and received a bursary from that city which enabled him, in 1837, to proceed to Paris, where he entered the studio of Delaroche. This does not seem to have been a congenial home for his early art life, yet at first he struggled to comply with his surroundings and painted genres in the style of Watteau (q.v.) and Boucher (see BOUCHER, FRANÇOIS), as well as Biblical and mythological incidents, with landscape backgrounds. It was in 1848 that he really found himself, and hit upon the line of art in which he could give utterance to the sincere feelings of his heart. This turning point in his career was marked by the appearance of his genre painting, taken from country life, ‘The Winnower.’ Henceforth his days were to be spent far from the glitter of Paris, the competition and jealousies of the studios; settling in Barbizon, on the edge of the forest of Fountainebleau, he devoted himself to the study and portrayal of peasant life. The hardship, toil and privation of the farm laborers he sympathized with acutely, and some have even accused him of being a social revolutionist, but he professed no views of this tendency, though his interpretation of the peasant's lot may be too gloomy and pessimistic, and his ironical bitterness of spirit such that it infected his canvas and clouded the beauty of external nature as depicted there. He himself was almost all his life battling with that poverty whose privations had early robbed him of his young wife. There is a profound pathos in his conception of the rural isolation and hardship of soil slavery, with all its stolid but unrequited patience, and this he has portrayed with a certain broad and impressionistic treatment which is both sincere and original. At first, his works were passed by or misunderstood, but gradually they were recognized at their true value, and he was hailed as the greatest painter of modern France. Since his death his pictures have been sold at enormous prices and are looked upon as the most precious pieces in private or public collections. His greatest picture, the ‘Angelus’ (1859), was bought at auction for $32,000. Millet himself sold his picture ‘The Woman with the Lamp’ for $2,800 in 1872. Shortly after it was sold for $4,600, and again for $7,000. In 1882 it fetched $18,000. The most important of his other works are: ‘The Sower’ (1850); ‘Man Spreading Manure’ (1852); ‘The Reapers’ (1853); ‘The Gleaners’ (1857, in the Louvre); ‘Death and the Woodcutter’; ‘La Becquée’ (Feeding Her Birds) — a mother feeding her three children from the same bowl. These all belong to his early period when he was tortured with sickness and harassed by debt. After the appearance of the ‘Angelus’ his reputation was established and he had reached smooth waters. In 1860 he produced his wonderful picture, the ‘Sheep-Shearing,’ in which he seems to express as much pity for the dumb beast as for the patience of the human toiler who is bent over it. In 1862 appeared the ‘Potato Planters’; in 1863 ‘The Wool Carder,’ and ‘The Man with the Hoe.’ In 1867 he was awarded at the Paris Exposition a medal of the 1st class. He took refuge in Cherbourg during the Franco-Prussian war, but returned to Barbizon in 1871, where he continued in broken health, though still working with untiring brush, until the end came.

Among the paintings of this artist now in the United States are: 'The Sower'; 'The Water Carrier' (Vanderbilt collection); 'A Peasant Grafting a Tree' (Rockefeller collection); 'The Turkey Tender' (C. A. Dana collection); 'The Buckwheat Threshers' and the 'Potato Planters' (Quincy Shaw collection); 'The Churners' (F. L. Ames collection); 'Potato Diggers' and 'Breaking Flax' (Walters collection).

The drawings, etchings, and pastels of Millet are eagerly sought after and always bring a high price at auctions or private sale. The most familiar is his own portrait, a sketch often reproduced. His 'Woman Feeding Chickens'; 'Flock of Sheep with Shepherd'; the 'Newborn Lamb'; 'Laundresses on the Shore' are best known. Among his pastels are 'The Vine Dresser' and 'Butter Making.' All his works show masterly drawing, and the landscapes which appear in many of them are put in with an ease and atmosphere worthy of the best periods of French art. His coloring may be sombre, and he disregards the power of the human countenance as giving expression to the sentiment of his conception. But the life of each picture is to be found in the inimitable pose of the figures, and the suggestiveness of the background. The hands, shoulders, and feet of these figures, as they move in harmony with forms cumbrous, almost grotesque, are made to suggest the dull torture in which stolid and half bestial creatures are held under the yoke of toil and poverty. The light reflected upon these figures from religious sentiment or natural affection only serves to intensify the profound melancholy by which the story of their lives is clouded.

Consult: Sensier, 'La Vie et l'Œuvre de Jean François Millet' (1881); and its abridged English translation, Boston (1896).

Mil'let, a popular name for many grasses grown in the Old World as cereals, but in the New almost wholly as forage. The principal ones are: True or broomcorn millet (*Panicum miliaceum*); foxtail millet (*Setaria italica*); barnyard or Japanese (*Panicum crus-galli*); pearl or cat-tail millet (*Pennisetum typhoideum*), and the African, Chinese, Indian, black and erroneously-called "pearl millet" (*Sorghum vulgare*). Sometimes *Elusine coracana* is called African millet. In general they constitute one of the most important groups of food-plants, since they are the staple diet of about one third of the world's population, the annual plantation in India alone being estimated at approximately 35,000,000 acres. The first three mentioned are the most important groups grown in the United States. The plants all thrive well upon rather light, well-drained soils, which should be prepared as for other cereal crops. In order to make a millet harvest succeed the harvest of other cereals, the seed is sown late in the spring. Broadcasting and drilling are both practised, the latter more extensively. Just after blossoming, the crop may be cut and cured for hay; for seed, just before the seed becomes fully mature to prevent loss from shattering. The hay makes valuable fodder, but some stockmen attribute various animal ailments to its excessive or exclusive use; others experience no such difficulties. The seed may be ground for stock food, but it is little used. For poultry, especially for young chicks, it is widely employed. Consult: Farmers' Bulletin No. 101, United States Department of Agriculture, and the 'Year Book' of the Department for 1898. See Grasses in the United States.

Milligan, mil'ĭ-gan, **William,** Scottish Presbyterian clergyman and commentator: b. Edinburgh 15 March 1821; d. Aberdeen 11 Dec. 1893. He was educated at the University of St. Andrews, entered the ministry of the Established Church of Scotland, held pastorates at Cameron and Kilconquhar, and was professor of Biblical criticism in the University of Aberdeen from 1860. He was one of the revisers of the New Testament and the author of 'The Higher Education of Women' (1878); 'Commentary on the Revelation' (1883); 'The Resurrection of the Dead' (1890); etc. He visited the United States in 1872 as a delegate to the Presbyterian General Assembly from the General Assembly of the Scottish Church.

Milligan College, in Milligan, Tenn.; a coeducational institution founded in 1882 under the auspices of the Disciples of Christ. It has a preparatory department and a college department; the courses lead to the degrees of A.B., B.S., and Ph.B. In 1910 there were connected with the school 16 professors and over 271 students. The library contained about 3,000 volumes. The grounds and buildings were valued at $16,300, and the income was about $37,000.

Milligan Decision, The, an important ruling of the United States Supreme Court in 1866. In 1864 an Indiana man named Milligan was arrested by a United States officer on charges of conspiracy, inciting insurrection, and giving aid to the enemy. He was tried by a military commission, found guilty, and sentenced to be hanged. His counsel filed in the circuit court a petition for a writ of habeas corpus, claiming that the plaintiff was a civilian in no way connected with the military service, and that he was not in a rebel State. The case was carried to the Supreme Court, where it was held that a military commission organized during the war in a State not invaded or in rebellion, and where the Federal courts were open and unobstructed, had no jurisdiction to try, convict or sentence for a criminal offense a citizen who was neither a resident of a State in rebellion nor a prisoner of war.

Milligram, the thousandth part of a gram. See Weights and Measures.

Milliken's Bend, Engagement at. Milliken's Bend, La., on the west bank of the Mississippi, about 15 miles above Vicksburg, was the base of some of the military operations against that place and the lower Mississippi. Early in June 1863, when Grant was besieging Vicksburg from the east, Gen. E. Kirby Smith, commanding the Confederate department of the Trans-Mississippi, sent Gen. J. G. Walker's division of 4,000 men to seize the place and other points on the river, and open communication with General Pemberton, in Vicksburg, with the object of furnishing him supplies, or, failing in that, to cover his escape across the river. Walker moved to Alexandria, La., and reported to Gen. R. Taylor, commanding in West Louisiana, and was sent in transports up the Washita and Tensas rivers, until abreast of Vicksburg, when he landed and marched across to Richmond. At this time Milliken's Bend was held by Gen. E. S. Dennis, with about 1400 men, mostly colored troops. A reconnoitering party sent out by Dennis was driven back by the Confederates. Walker arrived at Richmond at 10 A.M. of the 6th, and was ordered by Taylor to send one brigade to Young's Point and one to Milliken's Bend, distant respectively 20 and 10 miles, and to hold a third brigade in reserve six miles in advance of Richmond. Harris' brigade moved at night on Young's Point, was delayed, and accomplished nothing. Gen. H. E. McCulloch, with a Texas brigade of 1,600 men and 200 cavalry, marched from Richmond at 6. P.M. of the 6th, and at 3 A.M. of the 7th, when, within one and a half miles of Milliken's Bend, the Union skirmishers were encountered and the Confederate advance driven back in some disorder; but McCulloch rallied his men and pushed on, driving the Union troops back slowly to their main line, carrying the Union breastworks and driving the Union troops back to the bank of the river, where two gunboats came to their assistance and, pouring shells into the ranks of the Confederates, obliged them to withdraw and return to Richmond. The Union loss was 127 killed, 287 wounded, and 266 missing; the Confederates lost 44 killed, 131 wounded, and 10 missing. Consult 'Official Records,' Vol. XXIV.

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Millikin, James, American banker and philanthropist: b. Pennsylvania 2 Aug. 1830; d. Orlando, Fla., 2 March 1909. In 1860 he engaged in banking, later founded the firm of Millikin & Company at Decatur, Ill., now the Millikin National Bank, of which he was the president. He is also president of the Union Works. Mr. Millikin was long known for his philanthropic and benevolent enterprises; for his generous liberality to charities and churches, irrespective of denominations, and for his ready recognition of able and deserving young men, to many of whom he has given valuable assistance in accumulating wealth. He founded the Anna B. Millikin Home, an institution for the care of aged women and children, built and supported mostly by him, and named by the board of directors after his wife, Anna B. Millikin. He founded also the James Millikin University, dedicated in 1904 by President Roosevelt.

Mil'lis, John, American military engineer: b. Wheatland, Mich., 31 Dec. 1858. He was graduated from West Point in 1881 and served in the engineering corps until 1883, after which he performed various engineering duties under the government, and in 1894–8 was chief-engineer of the United States Lighthouse Board at Washington. In 1898–1900 he was on duty with the engineers' battalion at Willet's Point, N. Y., and in Cuba. He was sent as delegate to various engineering conferences in Paris in 1900, and visited Egypt on inspecting duty. Since 1900 he has been on duty at Puget Sound, engaged in river and harbor improvements and fortifications.

Mills, Albert Leopold, American military officer: b. New York city 7 May 1854. He was graduated from West Point in 1879 and was commissioned in the cavalry. He served in several campaigns against the Indians and in 1894–8 was instructor in the United States military school at Fort Leavenworth, Kan. Upon the opening of the war with Spain he was ordered to the front, where he rendered distinguished service at the battles of Las Guasimas and Santiago and was brevetted major and lieutenant-colonel. From 1898–1906 he was superintendent at West Point, with the rank of colonel and regimental captain.

Mills, Benjamin Fay, American Unitarian clergyman: b. Rahway, N. J., 4 June 1857. He was graduated from Lake Forest University (Ill.) in 1879, was ordained to the Congregational ministry in 1878, held a pastorate at Rutland, Vt., was a prominent evangelist in 1886–97. In 1897 he withdrew from the Congregational denomination owing to his liberal views, and in 1897–9 conducted independent religious meetings in Boston. In October 1899 he became pastor of the First Unitarian Church at Oakland, Cal. Among his books are: 'Power from on High' (1889); 'Victory through Surrender' (1892); 'God's World' (1893).

Mills, Clark, American sculptor: b. Onondaga County 1 Dec. 1815; d. Washington, D. C., 12 Jan. 1883. He went south, learned the millwright's trade, worked at New Orleans, and later at Charleston, where he was employed by a plasterer, and discovered a method for taking a cast from the living face which enabled him to make plaster busts cheaply. In 1845 he completed a bust in marble of Calhoun, which was placed in the Charleston city-hall in 1846. In 1848 he was appointed by the government to execute an equestrian statue of Andrew Jackson. This was the first large statue cast in metal in the United States. Mills was obliged to learn casting, since there was then no foundry in the country adequate to the work, and when the statue was at last completed it was at a loss to himself of $7,000. This was later repaid to him by Congress in an appropriation of $20,000 for a replica at New Orleans. His colossal equestrian statue of Washington, depicting the general at the battle of Princeton, was unveiled at Washington on 22 Feb. 1860. He also cast from designs by Thomas Crawford (q.v.) the statue of 'Freedom' which was placed surmounting the dome of the Capitol in 1863, and took a life-mask of President Lincoln shortly before the latter's death.

Mills, Darius Ogden, American banker and capitalist: b. North Salem, Westchester Co., N. Y., 25 Sept. 1825; d. 3 Jan. 1910. He was educated in the North Salem Academy and the Mount Pleasant Academy, Sing Sing, N. Y., later becoming cashier of the Merchants Bank of Erie Co., Buffalo, N. Y. In 1849 he went to California where he founded the banking house of D. O. Mills and Co.; from 1864–7 was president of the Bank of California, San Francisco, and after the failure of the institution again taking charge of it until 1878. After 1880 he was largely interested in New York real estate; also prominent in philanthropic enterprises, the Mills Hotels (q.v.) being the most noted examples of his generosity.

Mills, David, Canadian jurist: b. Oxford, Ontario, 18 March 1831. He was educated at the University of Michigan and entered early upon a public life. He served in the Dominion House of Commons 1867–96 and was editor of the *Canada Daily Advertiser,* London, Ont., 1882–7. In 1876–8 he was minister of the interior and was minister of justice 1897–1901, since when he has been justice of the Supreme Court of Canada. He has contributed to the magazines many articles on public questions and has published 'The English in Africa' (1900)

Mills, Job Smith, American United Brethren bishop: b. near Portsmouth, Ohio, 28 Feb. 1848. He was graduated from the Illinois Wesleyan University and studied for the ministry. In 1874–80, 1885–7 he was pastor of Otterbein University, Watertown, Ohio, and in 1887–93 was professor in various branches and then president of Western College, Toledo. He was made bishop in 1893 and has since visited the principal universities of Europe. He has written: 'Mission Work in West Africa' (1898); 'Holiness' (1902); etc.

Mills, Lawrence Heyworth, American philologist: b. New York 1837. He was graduated at New York University in 1857, and at Fairfax Episcopal Theological Seminary, Va.; and entered the Episcopal ministry in 1861. He was stationed in Brooklyn for six years; retired from the ministry in 1867; studied Gnosticism and the Avesta in Europe 1872–87; and in the last named year, having established his reputation as an authority on the Zend-Avesta, went on Max Müller's invitation to Oxford, where he became professor of Zend philology in 1898. He contributed largely to Oriental journals various papers on the Gâthâs and early Zoroastrianism; translated 'Zend-Avesta' (Part III. in 'Sacred Books of the East,' 1887); and wrote: 'Study of the Five Zarathustrian Gâthâs' (1894); 'Gâthâs of Zarathustra in Metre and Rhythm' (1900); 'Dictionary of the Gâthic Language of the Zend-Avesta' (1902); and 'Zoroaster, Philo, and Israel' (1903).

Mills, Robert, American architect and engineer: b. Charleston, S. C., 1781; d. Washington, D. C., March 1855. He was a pupil of the architect Benjamin Latrobe (q.v.), and beside designing important structures in Philadelphia, including the single-arch bridge across the Schuylkill, erected custom-houses and marine hospitals in various parts of the United States and the Washington Monument in Baltimore. In 1837 he was appointed architect of the general government at Washington, where he built the Treasury, General Post-Office, and Patent Office, and designed the Washington Monument. He published: 'Statistics of South Carolina' (1826); 'American Pharos, or Lighthouse Guide' (1832); etc.

Mills, Roger Quarles, American lawyer and politician: b. Todd County, Ky., 30 March 1832. He moved to Texas in 1849, and studied law; was admitted to the bar at 20, the Texan legislature removing the disability of minority; and began practice at Corsicana. In 1859 he was elected to the Texas legislature. On the outbreak of the Civil War he joined the Confederate service, and fought throughout the war. In 1872 he was elected to Congress as a Democrat, serving till 1892; he was chairman of the House committee on ways and means, and drafted the Mills Tariff Bill, which, however, failed to become a law. In 1892 he was elected to the Senate to fill an unexpired term, and in 1893 was re-elected for the full term of six years.

Mills, Samuel John, American Congregationalist clergyman: b. Torringford, Conn., 21 April 1783; d. at sea 16 June 1818. He was graduated from Williams College in 1809, where he had as an undergraduate organized the first society of foreign missionaries in America, and he afterward studied at Yale and at Andover Seminary. In 1810 he founded the American Board of Commissioners for Foreign Missions. He was licensed to preach in 1812 and at once went on a missionary tour through the Southern States, and made a second tour in 1814, succeeding in organizing various religious societies. He was ordained to the ministry in 1815 and in 1817 was sent to Africa to select a site for a colony. He died on the way home.

Mills, Walter Thomas, American Socialist lecturer: b. Duane, N. Y., 1856. He was graduated from Wooster University in 1885. He was one of the editors of the 'New Voice' (1885–7); and editor of the 'Statesman Magazine,' Chicago (1887–90). He was the first delegate sent by the American Federation of Labor to the British Trades Congress in 1892; and was general chairman on Labor Congresses for the World's Fair at Chicago. In 1893–1900 he was engaged in trying to establish a self-supporting farm scheme; in 1900 he allied himself with the Socialist party, and established the International School of Social Economy, of which he has been principal. This school had, in 1903, 2,800 correspondence students, and held four sessions of special training school courses. He has written 'Science of Politics' (1887), 'Social Economy' (1903); etc.

Mills Bill. See TARIFF.

Mills College, at Mills College (P. O.) in Alameda County, Cal., was founded in 1871 as Mills Seminary for Young Women. It was chartered as a college in 1885. It has preparatory and business departments and a college department, the courses of which lead to the degrees of A.B. and B.L. In 1910 there were connected with the college 35 instructors and 135 students. The property was valued at over $400,000.

Mills Hotels, the philanthropic enterprise of D. O. Mills (q. v.) inaugurated in 1897. There are three hotels situated in the tenement districts of New York City and built and operated for the purpose of housing and feeding the unemployed or small-salaried man. The Bleecker Street Hotel has 1,554 rooms, the Rivington Street Hotel 600, and the Seventh Avenue Hotel 2,000, the majority of which rent for 20 cents per night. These bedrooms are all separate, about 7½ x 6 feet in size, and containing a single iron bedstead, one chair and a closet. There are large reading, writing and smoking rooms, a well stocked library, free shower baths, custom laundry, news-stand, etc., conducted as in other first-class hotels. The restaurant is conducted so as to give good food, nutritious, well cooked, and at a price remarkable for cheapness. The average cost of living in the hotels has been from $3.50 to $4 per week, making them a haven for respectable poor men.

Mill'saps College, in Jackson, Miss., founded in 1892 by the M. E. Church South. The courses of study lead to the degrees of A.B., B.S., and Ph.B. In 1910 there were connected with the school 13 professors and instructors and 250 students. There were about 5,000 bound volumes and 3,000 pamphlets in the library, valued at $11,000. The grounds,

buildings, and apparatus were valued at $90,000; the productive funds were $300,000; and the total annual income was $21,000. In 1910 the benefactions were $2,400.

Millspaugh, mĭlz'pâ, **Charles Frederic,** American botanist: b. Ithaca, N. Y., 20 June 1854. He studied a year at Cornell; was graduated at the New York Homœopathic Medical College in 1881; practised medicine for 10 years; and became botanist of West Virginia University in 1891, professor of medical botany in the Chicago Homœopathic Medical College in 1897, having been curator of the department of botany in the Field Columbian Museum since 1894. He traveled in Mexico, in Brazil, and in the West Indies, and is the author of ‘American Medical Plants’ (1887); ‘Flora of St. Croix, D. W. I.’ (1902); ‘Plantæ Yucatanæ’ (1903); etc.

Millspaugh, Frank Rosebrook, American Protestant Episcopal bishop: b. Nichols, N. Y. He was graduated from the Shattuck School, Faribault, Minn., in 1870, and from the Seabury Divinity School there in 1873. He entered the Episcopal ministry in the year last named, served as missionary in Minnesota 1873–6, was subsequently dean of the Omaha (Neb.) Cathedral, rector of St. Paul's, Minneapolis, and dean of Topeka (Kan.) Cathedral. In 1895 he was consecrated bishop of Kansas.

Mill'stone, one of the two cylindrical stones used to grind grain into flour (q.v.). The best foreign stones are the German basaltic lava quarried near Cologne, and the French burstone; both are imported into the United States in small pieces from which the cylindrical stone is built up. The native stone is commonly used in the single piece; a sandstone found in Ulster County, N. Y., and in Lancaster County, Pa., and a burstone much like the French, are the best materials, being hard and tough and having a cellular structure, which in the burstone is due to the presence of fossil casts. The lower stone is usually fixed; the upper stone is the «runner.» Each stone is deeply scored with furrows, which lead the milled grist away from the centre; the intervals are styled «land»; and the hole in the centre is called the «eye.» A depression about the eye is the «bosom.» The scheme for scoring the stone varies greatly. The roller process (described under FLOUR) has relegated the millstone to the minor grist mills.

Mill'vale, Pa., borough, in Allegheny County; on the Allegheny River, and on the Pittsburg & W., the Buffalo, R. & P., and the Pennsylvania R.R.'s; opposite Pittsburg. It is really an industrial suburb of Pittsburg; its chief manufactures are lumber, iron products, saws, dressed stone, and steel products. The government is administered by a burgess, who holds office three years, and a council. The borough owns and operates the electric light plant and the waterworks. Pop. (1890) 3,809; (1900) 6,736; (1910) 7,861.

Millville, mĭl'vĭl, N. J., city in Cumberland County; on the Maurice River, and on the Pennsylvania railroad; about 43 miles south of Philadelphia. In 1801 Millville was incorporated as a town, and in 1866 received its city charter. It is a manufacturing city; its chief industrial establishments are foundries, glass factories, dye works, bleacheries, cotton mills, and machine shops. It has a fine high school, two libraries, several good church buildings, a large park in which is Union Lake, a body of water about three miles long and three fourths of a mile wide, and a number of fine private residences. The government is administered under a charter of 1873, which provides for a mayor, who holds office three years, and a common council, 12 of whose members are elected from wards, and one at large. Pop. (1890) 10,002; (1900) 10,583; (1910) 14,451.

Mil'man, Henry Hart, English historian and poet: b. London 10 Feb. 1791: d. near Ascot 24 Sept. 1868. He was graduated from Brasenose College, Oxford, in 1814, became a fellow of the college in that year, took orders in 1816, was appointed incumbent of St. Mary's, Reading, in 1818, and was professor of poetry at Oxford in 1821–31. In 1835 he became rector of St. Margaret's, Westminster, and in 1849 dean of St. Paul's. His best-known works are his ‘Fazio,’ a poetical drama (1815), first presented at London in 1818 with great success; ‘History of the Jews’ (1830); and his ‘Latin Christianity’ (1855), an excellent general survey written with admirable candor and breadth. Among his other publications are: ‘The Fall of Jerusalem’ (1820), a dramatic poem; ‘History of Christianity under the Empire’ (1840). Consult A. Milman, ‘Henry Hart Milman’ (1900).

Mil'more, Martin, American sculptor: b. Sligo, Ireland, 14 Sept. 1844; d. Roxbury Highlands, Boston, Mass., 21 July 1883. He studied at Boston with Thomas Ball, and established there his own studio. In 1863 he executed for the Sanitary fair the statuette ‘Devotion,’ later studied for a time in Rome, where he made busts of Pius IX., Charles Sumner, Wendell Phillips, Emerson, and others of prominence, and designed the soldiers' and sailors' monument on Boston Common, for which he had been commissioned by the city. This monument, generally regarded as his greatest work, was dedicated in 1877. He executed also the soldiers' monument at Charlestown, Mass., a mediocre composition ‘America’ at Fitchburg, Mass., and the ‘Weeping Lion’ at Colby University, Waterville, Me. His bust of Sumner is in the Metropolitan Museum, New York; that of Ticknor in the Boston Public Library; and a bronze copy of that of Phillips is also in the Boston Library, to which it was presented by the Phillips Memorial Association in 1900. One of his best known works is the huge granite Sphinx in Mount Auburn cemetery, Cambridge, Mass.

Miln, Louise Jordan, English journalist and author: b. 5 March 1864. After extensive travel she contributed to various London journals, such as the *Pall Mall Gazette*, the *Morning Post*, the *Times*, and particularly the *British Realm*, edited by her husband, G. C. Miln. Among her publications are: ‘When We Were Strolling Players in the East’ (1894); ‘Quaint Korea’ (1895); ‘An Actor's Wooing’ (1896); and ‘Little Folk of Many Lands’ (1899).

Milne, mĭln, **John, English geologist:** b. Liverpool, 1850. After study at the Royal School of Mines, London, he traveled in Iceland, mined in Newfoundland (1873–4), and in 1875 became professor of mining and geology under the Japanese government. He is a recognized authority on seismology, published a volume on 'Earthquakes' ('Natural Science' series), and established the Japanese Seismological Society (1886).

Milne-Edwards, Henri, ŏṅ-rē mēl-nā-dwär, French zoologist: b. Bruges 23 Oct. 1800; d. Paris 29 July 1885. His father was an Englishman, but the son was born and educated on the Continent; became M.D. at Paris in 1823; then began to study the zoology of lower animals; made two dredging expeditions near Granville in 1826 and 1828, describing his finds in a paper entitled 'Récherches anatomiques sur les Crustacés' (1828); was elected to the Academy of Sciences in 1838, succeeding Cuvier; in 1841 became professor of entomology in the Museum; held professorial chairs in the scientific faculty of the University of Paris; and in 1864 became director of the Museum. From 1837 he was an assistant editor of the 'Annales des Sciences Naturelles.' He established the idea of the division of physiological labor and was not in accord with modern theories of evolution, as is to be seen from his 'Introduction à la Zoologie générale' (1853). He also wrote 'Eléments de Zoologie' (1834); 'Histoire naturelle des Crustacés' (1837–41); 'Histoire naturelle des Coralliares' (1858–60); and an unfinished work, 'Lecons sur la Physiologie et l'Anatomie comparées de l'Homme et des Animaux' (1855–84).

Mil'ner, Sir Alfred, Viscount Milner, English administrator: b. Bonn, Germany, 1854. He studied in Germany, where his father had been instructor in English at the University of Tübingen, then at King's College, London, and at Balliol, Oxford; was fellow of New College, Oxford; studied law; and after several years in journalism, part of the time on the *Pall Mall Gazette,* became private secretary to Mr. Goschen, chancellor of the exchequer, in 1887. From 1889 to 1892 he was under-secretary of state for finance in Egypt; in 1892 became chairman of the Board of Inland Revenue; and in 1897 was appointed to the double post of high commissioner for South Africa and governor of Cape Colony. He still holds the former post. In 1900 he became administrator of the Transvaal and Orange River colonies, of which he was made governor in 1902. He took a prominent part in all negotiations with the Boers before, during, and after the war. He was made G.C.B. and baron in 1901 and viscount in 1902, is a man of much culture, and wrote 'England in Egypt' (1892).

Milnes, mĭlz, **Richard Monckton.** See Houghton, Richard Monckton Milnes.

Milo, mī'lō (Μίλων), ancient Greek athlete. He was a native of Crotona, in Magna Græcia, Italy, and celebrated for his great strength. He bore off the prize six times in the Olympic games, and on an equal number of occasions at the Pythian. He was appointed to command an army against the Sybarites, and at the battle at the Crathis, 511 B.C., his great strength is said by Diodorus to have given the victory to the Crotonians. Many anecdotes are related of him. He once carried a heifer of four years to the sacrifice on his shoulders, killed it with a blow of his fist, and afterward, it is added, ate the whole of it on one day. His death is characteristically related. When enfeebled by age he attempted to rend open the trunk of a tree partially split by wood-cutters, but the wood closing on his hands, held him fast, and he was attacked and devoured by wolves.

Milo, Titus Annius, Roman tribune and political leader: b. Lanuvium in early part 1st century B.C.; d. district of Thurii 48 B.C. In 57 B.C., when tribune of the plebs, his quarrel with Publius Clodius began. Seeking preferment in the state, he became the ally of Cneius Pompey, urging the recall of Cicero from exile, whither he had been sent at the instance of Clodius, as a pretext for their acts. Bands of gladiators in the employ of Milo and of Clodius kept Rome in constant terror by their skirmishes. Finally, in a clash at Bovillæ, on the Appian Way, Clodius was murdered 20 Jan. 52 B.C. Milo was impeached for acts of violence in occupying public places and going about under arms; and for bribery in his canvass for the consulship. His trial began 4 April 52 B.C. Cicero undertook his defense, but found opinion such that the speech was not made. In a revised and enlarged form it was sent by Cicero to Milo at Massilia (Marseilles), whither he had gone into exile upon his condemnation under the first count.

Milo, or **Milos.** See Melos.

Mil'osh, prince of Servia. See **Servia;** Obrenovitch.

Milouna (mĭ-loo'nä) **Pass,** Greece, a frontier-pass of the Olympian Mountains in Thessaly, a few miles north of Tyrnavos. On 18 April 1897 it was the scene of a fierce battle between the Turks and Greeks during the Græco-Turkish war of that year. About 50,000 men were engaged on both sides, and the Greeks were defeated with heavy loss.

Milreis, mĭl'rēs, or **Milrei,** a Portuguese coin and the unit of account in Portugal. A thousand reis is one milrei, equal to $1.06. In enumeration the figure $ is used to denote the thousandth place, thus one milrei is written 1$000. The colon marks the place of contos (one million reis), the period the place of thousands of millions.

Mil'roy, Robert Huston, American soldier: b. Washington County, Ind., 11 June 1816; d. 1890. He was graduated from Norwich University, Vt., in 1843 and served in the Mexican War, after which he studied law and was admitted to the bar in 1849. In 1851 he was appointed justice of the 8th judicial circuit court of Indiana. When the Civil War broke out he organized a company of volunteers and was mustered into service as colonel, later receiving the rank of brigadier-general, and in 1862 was made major-general. In 1863 he was engaged in battle with a superior force under General Lee and after a gallant fight of three days' duration was compelled to retreat. An investigation of his conduct followed, which resulted favorably for Milroy, who, however, resigned in 1865. He was trustee of the Wabash & Erie railroad in 1868, in 1868–74 was superintendent of Indian matters in Washington Territory and in 1874–85 Indian agent.

Miltiades, mĭl-tī'ạ-dēz, Athenian general: d. 489 B.C. He was a descendant of the Philaïdes, and, after being archon at Athens in 524, inherited a minor principality in the Chersonesus in 518. He governed well there; accompanied Darius against the Scythians in 515; and being left at the bridge across the Danube urged its destruction in order that Greece might thus be rid of a possible Persian enemy. This plan was vetoed by Histiæus, another Greek tyrant. In 493 he left his kingdom for fear of the Persians, and upon their invasion of Greece in 490 became one of the ten generals of the Athenian army. Each of the other generals retired in Miltiades' favor, but he refused to lead the army until his own day of command came. Then he won the great battle of Marathon, routing the Persian land forces. The victorious general in the next year asked the state of Athens for a fleet of 70 ships, got his request, but did not explain that he wished to punish the people of Paros, and, when his expedition failed and its purpose was known, he was impeached, fined 50 talents, and imprisoned for lack of ability to pay. He died in prison of a wound got at Paros.

Miltiades, also called Melchiades, Pope or bishop of Rome from 2 July 310 to 10 or 11 Jan. 314. He is best known as having sat as presiding officer at a synod consisting at first of five bishops, then of 20 bishops, held at Rome in 313, by desire of the Emperor Constantine, to hear a petition from the Traditones or Catholics in North Africa who had, on demand of the Emperor Diocletian, given up their sacred books and thus, in the opinion of those who resisted the demand, forfeited the rights and privileges of church membership. The action of the Traditones split the Church into two bitter factions, a condition that was not suppressed until several synods and other courts, of which the Roman synod was one, had effectually quelched the movement by denying the pleas of the Traditones on every occasion. Nothing is known of the early history of Miltiades, except that he was born in Africa, and the date of his death is uncertain.

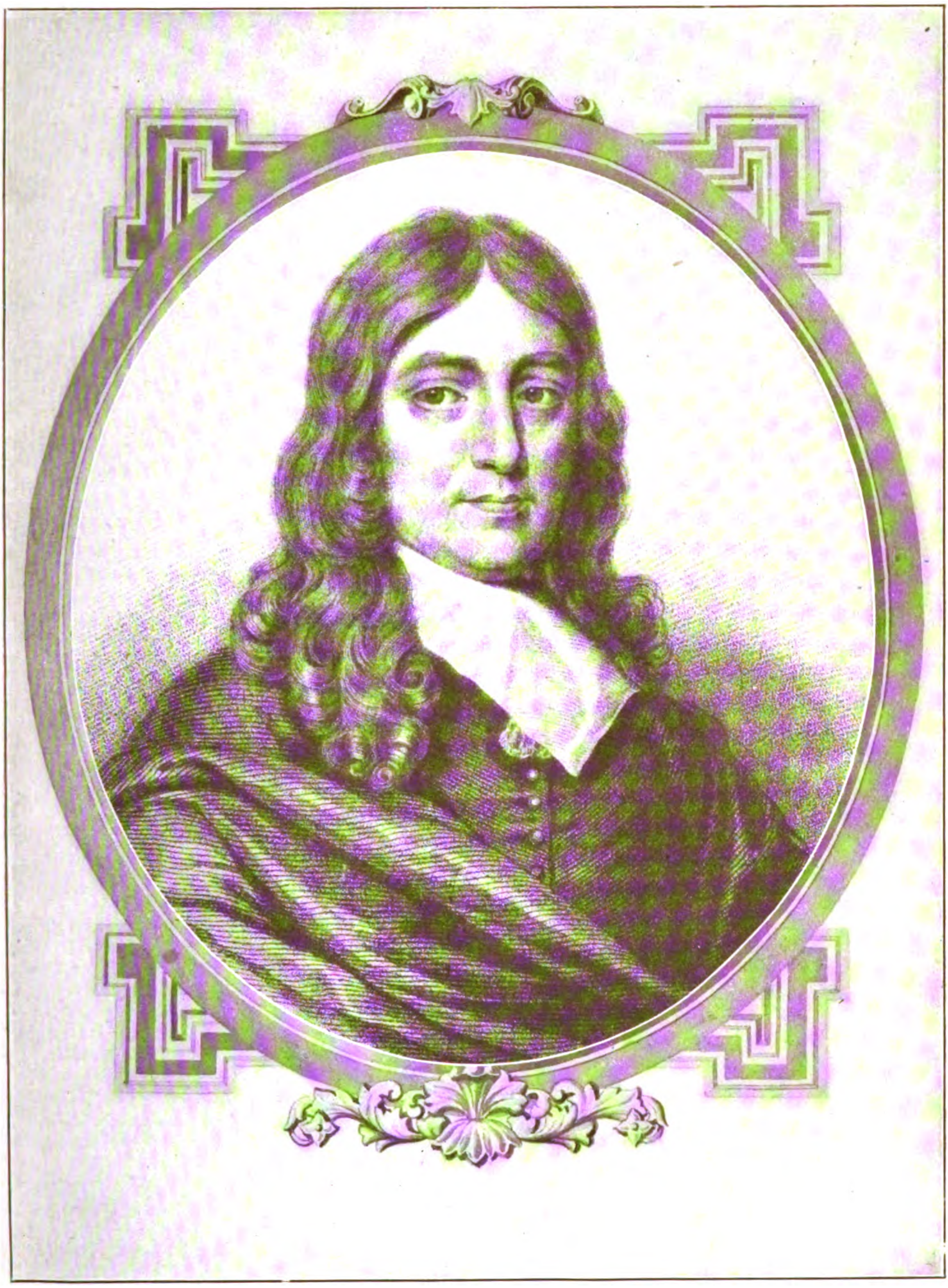
Miltitz, Karl Von, German ecclesiastic: b. about 1490; d. about 1529. He was the son of a nobleman of Saxony, entered upon a clerical career as priest and subsequently entered the Church as Canon of Mainz, Treves and Meissen. By favor of Pope Leo X, after appointment as a papal notary in 1515, he was chosen by that pontiff to confer with Luther, then very troublesome to the Church authorities, also with Frederick, the Wise, of Saxony, Luther's protector. The sale of indulgences had been condemned by Luther and Miltitz was dispatched to the scene of Luther's activity with a view to pacification. The whole subject was earnestly discussed and as an outcome of the conference, Luther promised to submit and possibly recant his heredical opinions. Later meetings between the Saxon priest and Miltitz took place at Altenberg, Liebenwerda and Nichtenberg, but the triumph of the Pope's envoy was annulled by the receipt of a Papal bull of denunciation before the conference came to an ending. Miltitz was subsequently sent to discipline Tetzel, the priest who had aroused Luther's ire and denounced him as being both indiscreet and unclerical. Miltitz died, it is supposed, by drowning when on his way back to the Vactican.

Milton, John, English poet: b. London 9 Dec. 1608; d. London 8 Nov. 1674. He was the son of John Milton (d. 1647), a prosperous and cultivated scrivener with marked leanings to Puritanism, and Sarah Jeffrey (d. 1637), of whom little is known. The pair had six children, three of whom came to maturity. The eldest of these was Anne, mother of the infant girl upon whom Milton wrote his elegy, 'O fairest flower, no sooner blown than blasted;' of Edward Phillips, author of 'Theatrum Poetarum,' and of the hack-writer, John Phillips, both of whom Milton taught. She married for her second husband Thomas Agar. John, the poet, was the second of the Miltons' surviving children. The youngest was Christopher (1615–1693), who became a loyalist and a Roman Catholic, and was knighted and made a judge by James II.

Milton was born in Bread street, Cheapside, at the sign of the Spread Eagle, where his father conducted his business. The elder Milton was a talented organist and composer, who is said to have taught his son to play the organ, and to have made his house the resort of the best musicians of the day. John was beautiful in childhood, and soon showed literary and scholarly proclivities. He was at first taught at home by Thomas Young, afterward a noted Puritan clergyman, to whom he addressed his fourth Latin elegy. Then he attended Saint Paul's school under the two Alexander Gills, profiting from the classical acquirements of the elder. Here he formed the most memorable of his friendships, that with Charles Diodati, the son of an Italian Protestant who had settled in London as a physician. He spent between four and five years at this school, straining his eyes with study, learning five languages, and reading much poetry, especially that of Spenser, whom he later acknowledged as a master, and Joshua Sylvester's (q. v.) uncouth translation of DuBartas, which had a slightly deleterious influence upon his own early poetical compositions. Metrical paraphrases of Psalms CXIV and CXXXVI, preserved by Milton, furnish specimens of his juvenile accomplishments.

On 9 April 1625 he matriculated as a pensioner of Christ's College, Cambridge, his tutor being William Chappell, a religious controversialist, afterward Bishop of Cork. With this tutor Milton had some unexplained trouble, which apparently led to a short rustication and to his transfer to another tutor. The interlineation in the manuscript of Aubrey's sketch of the poet to the effect that Chappell "whipt" his most famous pupil may refer to some sort of personal encounter, or else may represent anti-Puritan gossip.

It is abundantly clear from later references to Cambridge in his writings, that Milton, although he was honored for his character and his scholarship, and was several times selected to represent his college as a public speaker, had no great respect for the university's methods and ideals. His beauty of person and his chaste life gained him the nickname of "the lady," and he seems to have formed no special friendships with such promising undergraduates of other colleges as Thomas Randolph (q. v.) and Edmund Waller (q. v.), his seniors, or with John Cleveland (q. v.), the satirist, and Henry More (q. v.), the Platonist, junior members of his own college. This aloofness from his fellows and his apparent inability to find inspiring personalities among his instructors probably increased his absorption in his studies and encouraged him to correspond in Latin with Dio-



JOHN MILTON.

Univ. Library, UC Santa Cruz 2001

dati, then at Oxford, as well as to compose poetry, in both Latin and English, not inconsiderable in quantity and extraordinarily good in quality. ‹On the Morning of Christ's Nativity› (1629) is the crowning performance of this period and, despite some youthful defects of fantastic extravagance, is one of the few really great odes in our literature. Less excellent but still memorable are the lines on Shakespeare (1630), the sonnet ‹On his Having Arrived at the Age of Twenty-Three,› and ‹An Epitaph on the Marchioness of Winchester.›

Milton, whose brother Christopher had followed him to Christ's, took his bachelor's degree 26 March 1629, and his master's 3 July 1632. He tells us that the college authorities would have been glad if he could have continued to reside with them — probably as a fellow. His design had been to take orders in the church; but the high-church reaction, which Archbishop Laud was fostering, was obnoxious to him, and he was unwilling to come under the control of that masterful prelate. Theological difficulties and objections to an elaborate ritual do not seem to have weighed greatly with him at this time — certainly not to such a degree as the natural aversion of a proud and liberty-loving spirit to submit to the restraints imposed by an ecclesiastical organization dominated by a zealot. No other profession specially attracting him — though there are hints that he thought of the law — he gave himself up to reading and study, with the hope that he might later compose something the world «would not willingly let die.» As this meant that for several years he must be a charge upon his father, the latter surely deserved the thanks conveyed to him in the Latin poem entitled ‹Ad Patrem,› and he should be considered one of the most farseeing of parents.

From July 1632 to April 1638 Milton lived at his father's semi-suburban residence at Horton, in Buckinghamshire. He visited London to purchase books and to take lessons in mathematics and music; but he doubtless found his chief interest at home in studying the classics and French and Italian literature, and in enjoying the beauties of the country around him. His occupations and ideals seem to be described in the companion poems ‹L'Allegro› and ‹Il Penseroso,› which are generally assigned to the second half of 1632; unless, indeed, these idyllic pieces, contrasting as they do two varieties of temperament and modes of life, represent the perplexed state of his mind when he was choosing between a secular and an ecclesiastical career, and belong to a slightly earlier period. To the Horton epoch we certainly owe three of the most notable of his so-called ‹Minor Poems› — the songs and rhymed speech entitled ‹Arcades,› the masque ‹Comus,› and the pastoral elegy ‹Lycidas.› The first named was part of an entertainment given before the Countess-dowager of Derby at Harefield in 1633 or 1634. The music for this was furnished by the composer Henry Lawes (q. v), a friend of Milton's family, and their copartnership in the slighter performance probably led to their association in providing a masque for the celebration of the entrance of the Earl of Bridgewater upon his duties as president of the council of Wales. ‹Comus,› as the masque has been called without Milton's authorization, was probably performed in the great hall of Ludlow Castle on Michaelmas-night (29 September) 1634. So many of Lawes's friends asked afterward to be allowed to read it that the composer had an edition published anonymously in 1637. From that day to this it has been one of the most admired of English poems, and whatever its defects of construction, it is unsurpassed as an idealistic presentation of the power and charm of personal purity. The year that ‹Comus› was printed saw also the writing of ‹Lycidas,› which has been pronounced by Tennyson to be a «touchs one of poetic taste» and by Dr. Johnson to be a poem which no man would pretend to enjoy if he did not know that Milton was its author. This elegy was first published in 1638 in a volume of academic tributes to Edward King, a successful rival of Milton's for a fellowship, who was drowned in the Irish channel in August 1637. The apparent absence of great personal interest on the part of the poet in his subject, and the decreased toleration of the conventions of pastoral poetry, probably account for much of the adverse criticism ‹Lycidas› has received; but it should be remembered that Milton could have attained the requisite sincerity of utterance by centering his thoughts and emotions upon the loss sustained by the church in the death of so promising a clergyman, and that such consummate art of versification and diction as ‹Lycidas› displays and such a felicitous adaptation of a time-honored form of poetry to comparatively modern uses should render a poem, which a series of competent judges has pronounced a masterpiece, unamenable to the censure of the catholic reader. On the other hand, it may be remarked that it seems somewhat uncritical to rank, as is often done, these poems of the young poet of Horton, admirable but still not magnificent in scope above the sublime masterpieces which gave Milton his place among the supreme poets of the world. It is scarcely conceivable that if Milton had died immediately after writing ‹Lycidas,› his name would now be widely known outside the English-speaking nations.

In 1638, after his mother's death, Milton, through his father's generosity, was enabled to take a foreign tour in a style befitting a gentleman. At Paris he met Grotius (q. v.), but he did not like the city and passed soon into Italy, going by sea from Nice to Leghorn. He spent about a year on the peninsula, two visits of some two months each being given to Florence, where he made friends among men of culture, and impressed them by his accomplishments, both in the classics and in Italian. In Rome his outspoken protestantism almost got him into trouble. At Naples he formed an acquaintance with the aged Marquis Manso, the protector of Tasso and Marini, to whom he addressed some Latin verses important as showing that he was planning an epic upon King Arthur. Here he abandoned his intention of visiting Sicily and Greece, since the political news from England was too disturbing to allow a patriot to wander far from home. He made a leisurely return, was in Geneva early in July 1639, where he probably heard of the death of Diodati, and landed in England toward the end of the month.

The literary memorials of the tour consist of a few fluent Italian sonnets and a canzone (which afford shadowy evidence of a love affair with a young lady of Bologna), and some Latin verses, including three epigrams to the noted singer, Leonora Baroni. Milton does not seem to have profited greatly from what he saw of the treasures of plastic art, but his contact with historic places and with the natural beauties of Italy, and his association with great men, of whom Galileo, whom he met at Florence, is the most illustrious, must have broadened and deepened his capacities of thought and feeling. With the close of his journey and the composition of what is practically his last, and plainly his best, Latin poem, the touching pastoral elegy on Charles Diodati, entitled 'Epitaphium Damonis,' Milton's first period ends. The comely, accomplished young man, who blends the grace of the Cavalier with the serious purpose of the Puritan, gives place to the strenuous controversialist, the zealous reformer in Church and State, the idealistic partisan. The poet is not entirely swallowed up in the prose man, but he is nearly submerged.

On his return to England Milton took lodgings in Saint Bride's Churchyard and began to tutor the two children of his sister by her first marriage, Edward and John Phillips. Then he moved to a house in Aldersgate street, where his nephews boarded with him. Here he lived the life of an abstemious student and developed and practised the stimulating, though rather visionary, educational theories later outlined in his letter to Hartlib (June 1644). In 1643 he received a few more pupils, and he continued to play the part of schoolmaster until the autumn of 1647, when his father's death apparently left him in fairly comfortable circumstances.

Meanwhile he had been giving earnest of his literary and scholarly ambitions and of his interest in public affairs, which were rapidly approaching chaos. He planned to write some poem on a noble scale, whether a tragedy or an epic, and he made a list of nearly a hundred possible subjects, chosen from sacred and early English history. At the head of this were four entries which show that the theme of 'Paradise Lost,' to be treated in the form of a Greek tragedy, was then uppermost in his mind. There were also two entries dealing with the story of Samson, one of which later bore fruit in 'Samson Agonistes.' But the times were not propitious to poetical composition, and for nearly 20 years Milton wrote only occasional sonnets and scraps of verse, besides some rather astonishingly doggerel versions of Psalms. In 1645, however, he collected his somewhat scanty tale of English and Latin poems into a volume, which was published by Humphrey Moseley, the Tonson or the Moxon of the day. It seems to have made much less impression on readers than the collection of Waller's poems issued the same year. He also worked upon tasks in keeping with his duties as schoolmaster, such as his 'History of Britain,' to the Norman conquest, not published until 1670, and, probably, his 'Accidence commenc't Grammar' (1669) and 'Artis Logicae Plenior Institutio ad P. Remi Methodum concinnata' (1670).

His prose writings practically began in the summer of 1641 with his 'Of Reformation Touching Church Discipline in England.' Attacks had been made in the Long Parliament upon the episcopal system, and the Bishop of Exeter (later of Norwich), Joseph Hall (q. v.), long since famous as a satirist, had published a defense of his order and a remonstrance to Parliament, which had drawn forth a reply from five Puritan divines under the pen-name 'Smectymnuus' formed from their initials. The «t» and the «y» of this uncouth compound were furnished by Milton's former tutor, Thomas Young, who is probably responsible for his pupil's throwing himself into the fray. Hall replied to 'Smectymnuus' and secured the support of the learned Archbishop Usher (q. v.), and the five Puritans vindicated themselves. Milton's was the sixth pamphlet of the series and between May 1641 and April 1642 he contributed four others — 'Prelatical Episcopacy' (June 1641, a reply to Usher); 'Animadversions upon the Remonstrant's Defense against Smectymnuus' (July 1641, a bitter, point by point answer to Hall's reply to 'Smectymnuus'); 'The Reason of Church-government urged against Prelaty' (about February 1641–42, his most weighty and dignified argument against the episcopal system); and 'Apology against a Pamphlet called A Modest Confutation of Animadversions upon the Remonstrant against Smectymnuus' (March 1641–42, a reply to the pamphlet, whose title is included in his own title, which was apparently the work of Hall and his son, and was certainly a personal attack, the grossness of which largely extenuated the fierceness of Milton's retort).

Of these five anti-prelatical tracts, none of which is of great length, the first and third have most value in themselves, because they have a broad basis in history, philosophy, and theology, and thus afford proofs of Milton's learning and of his powers as an idealistic controversialist. The three others too frequently give unpleasant evidence that Milton was an almost unrivalled master of personal invective. The chief value of the entire series lies in the fact that they contain much nobly conceived and expressed autobiographical information, as well as some of the most sonorously harmonious prose to be found in any literature — for example, the closing paragraphs of the first tract. In general, their cumbrous style, their involved arguments, and their antiquated subject-matter make them difficult reading to all save professed Miltonians; but, when their many merits are duly weighed and the standards of 17th century controversy are borne in mind, it seems scarcely an exaggeration to say that they combine with Milton's other works in prose and verse to give his fame a broader foundation than is probably possessed by any other English writer.

The pamphleteer and poet appears to have determined deliberately that he could do his country more good by writing on subjects of public concern than by entering the army. It was doubtless a wise decision. This can hardly be said of his resolve to marry. In the spring of 1643 he took a mysterious journey into Oxfordshire — possibly to collect a debt owed him by a cavalier named Richard Powell. A few weeks later he returned to London with this gentleman's 17-year-old daughter Mary as his bride. Of the wooing and the reasons for the marriage nothing is known. The bride is said to have remained with Milton a month and then, finding her life dull, to have gone back to her father with the promise that she would return to her husband by the end of September. She failed to keep her promise and Milton sent a messenger for her, who was unpleasantly treated by her family. Then the irate husband declared he would never receive her, and wrote his first tract on divorce. Such is the story given by Edward Phillips. There is an extant copy of the divorce tract, however, which is marked 1 Aug. 1643 — and, unless this is a mistake, we are forced to believe that Milton was pleading for liberty to break the chains of matrimony at a time when, according to precedent, he should have regarded them as strings of roses. Such an idealist might have expressed such views without reference to his own experiences and desires, but it is hard to divest one's self of the belief that in this instance the wish was the father of the theory. It is almost certain that, whether or not there was between the pair a suddenly discovered incompatibility of temperament, each had reason to regret the alliance, Milton because he had too young and flighty a partner, his wife because her Puritan husband, twice as old as herself, was too serious and self-absorbed. In the absence of evidence it is idle to discuss the suggestion that the bride resolved to be one in name only.

In 'The Doctrine and Discipline of Divorce Restored, to the Good of Both Sexes,' Milton took the advanced stand that "obstinate incompatibility of mind or temper between husband and wife is as lawful a ground for divorce as infidelity" (Masson). He argued with his usual idealistic fervor and showed plainly that no man could have a higher conception of true marriage than he; but he was singularly blind to the weight of the sociological objections to his theory. His views naturally met with adverse criticism and he expanded them in a second edition under his own name (Feb. 1643-44). In July 1644 he published a less interesting, but far from feeble, tract entitled 'The Judgment of Martin Bucer on Divorce.' Then he was denounced before Parliament, which decreed that a licensing ordinance be prepared and that Milton and his printers be sought for. Nothing further happened, so far as the bold pamphleteer was concerned, save that later he came near being examined by the House of Lords, and that he was given the occasion to write the best known and most uniformly excellent of his prose works, his eloquent 'Areopagitica, or Speech for the Liberty of Unlicensed Printing' (Nov. 1644). It is needless to say that the Parliament he addressed so boldly with arguments, not absolutely liberal, but far in advance of his times, had no opportunity to listen to Milton's own voice, which, however, in a metaphorical sense has since echoed in every legislative hall of every free people. It is probable that he had friends in Parliament who blocked the measures taken to call him to account, and that in a less turbulent period he might have paid dearly for his rashness. As it was, he had the dubious honor of having a group of adherents named after him, and he published without molestation two more tracts on divorce — 'Tetrachordon, or Expositions upon the four chief places in Scripture which treat of marriage' (March 1644-45), and 'Colasterion: a Reply to a Nameless Answer Against the Doctrine and Discipline of Divorce,' (March 1644-45). The temper displayed in the latter pamphlet was not calculated to allay the hostile criticism that assailed him, nor was the rumor that he was courting the attractive daughter of a Dr. Davis particularly to his credit. This rumor and the financial distress of her royalist family seem to have brought Mrs. Milton to terms. She suddenly appeared before her husband while he was visiting at a neighbor's, begged his pardon, and was taken back.

The united couple took a larger house in the Barbican, and the school was somewhat enlarged. Between July 1646 and May 1652 three daughters and a son were born to them, the boy dying in infancy. The mother died not long after the birth of her last child. Meanwhile her father and mother, with some of their children, had been obliged to live with Milton, and money troubles had arisen, scarcely to be wondered at. Another house had also been taken — in High Holborn — and the school had been given up.

During these years Milton seems to have grown as radical in his ecclesiastical and political views as he apparently was in his educational theories and in his domestic economy. He sympathized with the army against the Parliament, with the Independents against the Presbyterians, and was one of the first to approve the execution of Charles I. His loosely reasoned 'Tenure of Kings and Magistrates' appeared within two weeks of that event and was probably the cause of his speedy appointment as Latin Secretary to the Council of State at a salary of about £290 (March 1649-50). His main task was the translation of despatches intended for foreign governments, but he had also to answer attacks made on the home government, and, ironically enough, to act as a sort of censurer of the press. He was given official apartments in Scotland Yard, was expected to be present at audiences of foreign envoys, in short, held a post of considerable dignity and importance.

The first of his official publications was his 'Observations' on the Articles of Peace between Ormonde and the Irish rebels (May 1649). The second was 'Eikonoklastes,' a point for point answer to the popular 'Eikon Basilike,' supposed to be the last meditations of Charles I., but really, it would seem, the work of John Gauden (q. v.). Milton's answer, which appeared in October 1649, is perhaps the strongest of his controversial pamphlets, but it is now mainly known for its exposure of a plagiarism by Gauden from Sidney's 'Arcadia' and for the over-emphasized evidence it affords of Milton's increasing Puritanism in matters of taste. Another answer to a more important book was the 'Defensio Pro Populo Anglicano,' published in or about March 1650 to counteract the effect produced by the 'Defensio Regia pro Carolo I.,' which the learned Salmasius (Claude de Saumaise, professor at Leyden) had written at the instigation of Charles II. Milton's book gave him a continental reputation, for it was generally felt that he had shown himself to be a match for Salmasius (q. v.) as a writer of Latin, and more than a match as a scurrilous controversialist. Such a reputation was, however, but a slight recompense for the loss of his sight, which was partly due to his persisting to labor on this book as a patriotic task despite the warnings of his physicians. The glaucoma, from which he seems to have suffered, would probably have ended in blindness in any event, but the sublimity of the poet's patriotic self-sacrifice is scarcely lessened by this fact.

Milton's next book was his 'Defensio Secunda' (May 1654), a reply to an invective by Peter Du Moulin which had been edited by a professor in Holland, one Alexander Morus or More, «a Frenchman of Scottish descent.» Milton mistook the editor for the writer and overwhelmed him with abuse, not disdaining to rake up charges of sexual misconduct. Morus naturally but unluckily attempted a reply and was again violently assailed by Milton in his 'Pro Se Defensio' (August 1655). Even the most devoted Miltonian must regret the writing of these gross tracts, although the former does contain interesting passages illustrative of its author's life and political ideals.

Meanwhile Milton at the close of 1651 had removed to a house in Petty France, Westminster. By the middle of 1652 he was wholly blind, but he continued with the help of assistants to do the work of his office at a reduced salary. The most important despatches, such as those of Cromwell protesting against the persecution of the Vaudois, were still intrusted to him. On 12 Nov. 1656 he married his second wife, Katherine Woodcock, who died 15 months later in childbirth. Milton wrote in her memory a fine sonnet, imitated from an Italian one, but beyond this testimony to her worth little is known of her. We are equally ignorant of the way his house — with a blind father and three small daughters — was conducted during his two periods of widowerhood. He had a small circle of friends, including two of his old pupils, Cyriac Skinner and Henry Lawrence, Lady Ranelagh, and Andrew Marvell (q. v.), the last named of whom from 1657 to 1660 assisted him in his duties as secretary. Toward the close of the Protectorate his literary work declined to the writing of a few sonnets and the publication of two or three ecclesiastical and political pamphlets, which are important chiefly as showing that he resisted steadfastly the drift toward monarchy and an established church. It is pathetic to find him at the end of Richard Cromwell's short régime willing to preserve republicanism in name only provided liberty of conscience could be secured. His projects were chimerical and were much ridiculed, the nobility of his idealism making but a slight appeal in such tumultous times. The dashing of his hopes as a reformer probably led his thoughts back, however, to the channel from which they had been diverted throughout the period of strife. From about 1658 he seems to have meditated an epic poem on the theme of 'Paradise Lost.' The Stuarts were restored to their kingdom and Milton to his; but, while we may be grateful for this, we need scarcely, with Mark Pattison, view Milton's controversial period as so many lost years. It seems better to agree with Dr. Garnett that 'Paradise Lost' would not be the poem it is if Milton had not been allowed to develop his powers through his contact with men and affairs.

At the Restoration Milton went into hiding in a friend's house. Two of his books were burned by the hangman, but in some unexplained way, partly no doubt through the influence of Marvell, he was not exempted from the benefits of the Act of Indemnity (29 Aug. 1660). Later he was arrested, but he was soon released and he had influence enough to protest vigorously against being required to pay excessive fees to the sergeant-at-arms of the House of Commons. His immunity from punishment caused much comment, and stories like that of a mock funeral and that of the intervention of Sir William D'Avenant (q. v.) in return for a previous similar intervention by Milton, were probably invented to account for what seemed to be an extraordinary case of leniency or of forgetfulness. When he was out of danger, Milton took a house in Holborn and then in Jewin street. The loss of his salary and of some investments doubtless forced him to lower his scale of living and also prompted him to look out for a third wife who would manage his home better than his eldest daughter did. In February 1662–63 he married Elizabeth Minshull, who seems to have made his last years comfortable in a house in Artillery Walk, Bunhill Fields.

Not long after this last marriage he appears to have finished 'Paradise Lost' and, with some trouble, to have secured a license for it from Thomas Tomkyns, chaplain to the Archbishop of Canterbury. During the plague of 1665 he retired to Chalfont St. Giles in Buckinghamshire, and there he loaned his Quaker friend, Thomas Ellwood (q. v.), the complete manuscrift of the great epic. Ellwood on returning it made the famous remark which led to the writing of 'Paradise Regained:' «Thou hast said much here of Paradise Lost, but what hast thou to say of Paradise Found?» It was not until April 1667, partly, perhaps, in consequence of the fire of 1666, that Milton secured a publisher for 'Paradise Lost.' Then he signed a contract with Samuel Symmons by which the latter was to pay £5 down and £5 more on the sale of each of the first three editions, which were not to exceed 1,500 copies apiece. This is usually referred to as a hard bargain, but in view of Milton's unpopularity, the length and theme of his poem, and his innovation in the use of blank verse, it seems unfair to blame Symmons. It is equally unfair to Milton's contemporaries to maintain that Addison's criticisms in 'The Spectator' first showed Englishmen that they possessed an epic poet worthy to rank with Homer and Virgil. Six editions had been published before the close of the 17th century, an elaborate Latin commentary had been written upon it, and Dryden and Marvell had extolled it. The religious nature of its theme has always, of course, given it a standing somewhat independent of its consummate poetic merits; but these, especially its sublimity and its unrivalled harmonies, have rarely been denied by competent critics of any nationality, and efforts to show Milton's excessive indebtedness to other poets, such as Andreini and Vondel, have not met with great success. That 'Paradise Lost' is a popular poem or Milton a poet whose genius is ungrudgingly acknowledged by all cannot be maintained; but the supreme and isolated greatness of both seems likely to escape serious challenge. When 'Paradise Regained' was finished and when 'Samson Agonistes' was written cannot be accurately determined. They appeared in one volume in 1671, and probably represent Milton's last creative literary labors. It is said that he could not bear to have 'Paradise Regained' pronounced inferior to 'Paradise Lost,' a fact, if fact it be, which has been twisted into the statement that he preferred the poem which the public most systematically neglects. This is scarcely credible since the theme, scope, and style of the two poems are so different as to render comparison rather meaningless save with regard to interest and to the level kept by the poet's imagination, points in which the superiority of 'Paradise Lost' is manifest. On the other hand, 'Paradise Regained' in its poised nobility and its artistic use of the materials furnished by the Gospel narratives of the Temptation is so perfect of its kind that Milton's indignation at hearing it undervalued is easily comprehended. 'Samson Agonistes' has fared better at the hands of critics and readers. It is probably the most successful tragedy of the Greek type ever written by an English, if not a modern, poet, and it is certainly full of the unquenchable spirit of its author. Samson blind, in the midst of his enemies, the victim of his own infatuation for a woman, was a hero with whom Milton, of all men, could thoroughly sympathize.

The poet's health was now undermined by the gout, and he devoted his closing years to setting his miscellaneous writings before the world in a proper shape. Besides the academic publications already mentioned, he revised his early poems in 1673, adding to them a few youthful pieces and some of his later sonnets, and the next year he collected his Familiar Epistles, with his College Exercises. On 8 Nov. 1674 he died peacefully, and four days later he was buried in Saint Giles, Cripplegate, beside his father. It may be inferred that some of the obloquy once heaped upon him had been dissipated, since his funeral was well attended. His daughters, who had not made his life pleasant, and whom he had employed as readers in languages they could not understand, and had not educated or perhaps appreciated as a schoolmaster and man of such refinement might have been expected to do, disputed with his widow the terms of his nuncupative will, but the matter was finally compromised. The widow survived till 1727, a date at which all trace of the poet's descendants through certain Clarkes in India seems to have been lost. The granddaughter for whose benefit 'Comus' was performed in 1750 had buried her seven children in infancy. Nor was the poet's progeny short-lived only; it appears to have sunk decidedly in the social scale.

From the portraits and descriptions of Milton it may be gathered that he was somewhat short and well made, with light hair and clear-cut features. He was stately in his manners, dressed neatly, was temperate and methodical in his habits, which were those of the student rather than of the artist, although he kept up his music to the end of his life. He was on pleasant terms with a small group of friends, and was accessible to foreigners of distinction. He took regular exercise and indulged in an occasional pipe. Perhaps his only striking eccentricity — for in such an age of confusion his religious and political radicalism should not excite surprise — was his adoption of the notion that his creative genius worked freely only from the «Autumnal Equinoctial to the Vernal.» It is at least fairly certain that his poetical powers were not so distinguished for affluence as for felicity and strength. When he was in the mood for composing (in his latter years) he seems to have stored up passages in his memory and to have dictated them by batches of 20 and 30 lines to any chance amanuensis he could secure.

Milton's position in English literature, as settled by popular consent, would seem to be not far below Shakespeare and well above all other authors. He has had and has adverse critics, however, while a few persons would place him at least on an equality with Shakespeare in greatness. As a conscious poet artist he has not been clearly surpassed in the literature of the world; he is doubtless the consummate master of the sublime; and he has few equals as a writer of erudite and sonorous prose. As an exponent of idealism in conduct he is almost as memorable as he is in his function of poet; as an inspired and inspiring patriot of liberal mould he is practically unparalleled. In total range of appeal as poet, scholar, patriot, and man his closest students are seldom willing to admit his inferiority to any other mortal.

The titles and dates of the main works published by Milton during his life have already been given. To these should be added, as posthumous publications, a surreptitious collection of 'Letters of State' (1676, translated by Phillips, 1694); 'A Brief History of Moscovia' (1682), and 'J. Miltoni Angli de Doctrina Christiana Libri diuo posthumi' (edited by Sumner, 1825). This treatise on 'Christian Doctrine,' the manuscript of which went through curious adventures, gives formal justification to the idea that Milton developed a sort of semi-Arianism, traces of which have been discerned in 'Paradise Lost.' Milton's 'Commonplace Book,' edited in 1876 and 1877 (for the Camden Society), seems to include nothing original. The MSS. now in the library of Trinity College, Cambridge, which contain the lists of subjects for a long poem and copies of several early poems, including 'Comus' and 'Lycidas,' were published in facsimile in 1899. Several productions have been attributed to Milton on but slight grounds, the latest being a romance in Latin, 'Novæ Solymæ Libri Sex' (1648), resuscitated by the Rev. Walter Begley and translated and published by him in 1902. Mr. Begley's defense of his attribution of the romance to Milton may be found in his long introduction and his appendices; for a good destructive criticism of his arguments see an article by Prof. W. A. Neilson in 'Modern Philology,' April 1904.

Bibliography.— Among the most important editions of Milton's poetical works are those of Newton (1749–52), Todd (1801, 1809), Sir Edgerton Brydges (1835), R. C. Browne (1870 — the English Poems), Masson (1874, 1877, 1882), Bradshaw (1892 — the New Aldine), W. V. Moody (1899), H. C. Beeching (1900), and W. Aldis Wright (1903). The Aldine edition of 1832, with a life by John Mitford, should also be mentioned, as well as Bentley's curious edition of «Paradise Lost» (1732), and Thomas Warton's excellent edition of the so-called Minor Poems (1785, 1791). Editions of separate poems, especially for school purposes, are very numerous. Of the prose works the following editions may be noted:— Of John Toland (1698), T. Birch (1738), T. Birch and R. Barron (1753), C. Symmons (1806), R. Fletcher (1833), R. W. Griswold (1847), J. A. St. John (Bohn's Standard Library, 5 vols. 1848–1853, including the 'Christian Doctrine'), J. Mitford

(1851, 8 vols., including the Poems, but not the 'Christian Doctrine'). There is no thoroughly good modern edition of the complete works. There are concordances to the Poems by C. D. Cleveland (1867), and John Bradshaw (1894).

The standard biography of Milton is the monumental work of Professor Masson (6 vols., 1859–80). Most of the editions mentioned above contain memoirs, which in some cases are very elaborate, e. g., that by Mitford in the edition of 1851. Of the early memoirs, that by Milton's nephew, Edward Phillips, was prefixed to his translation of the Letters of State (1694), and that by Toland to his edition of the prose works (1698). Later lives are by Thomas Keightley (1855), Alfred Stern ('Milton und Seine Zeit,' 1877–9), Mark Pattison (1879, in the English Men of Letters), Stopford Brooke (1879, in Classical Writers), and Richard Garnett (1890, in Great Writers, with a bibliography). Dr. Johnson's famous life in the 'Lives of the Poets' influenced public opinion against Milton until the tables were somewhat turned by Macaulay's enthusiastic essay in the 'Edinburgh Review' (1825). The number of essays and monographs and books dealing with special topics connected with Milton's life and works is, of course, very large, e. g., 'Milton's Prosody' (1893, 1901), by the poet Robert Bridges, and Edmundson's 'Milton and Vondel' (1885). Important critical discussions of moderate length may be found in the collected works of Matthew Arnold, Walter Bagehot, the elder William E. Channing, S. T. Coleridge, De Quincey, Emerson, Lowell, and Macaulay. To these critics may be added Augustine Birrell, Edward Dowden, Edmund Scherer, and Sir Leslie Stephen. Recent volumes dealing with the poet are Hiram Corson's 'Introduction to the Works of Milton' (1899), W. P. Trent's 'John Milton: a Short Study of his Life and Works' (1899), and Walter Raleigh's 'Milton' (1900). The chief histories of English literature, such as Taine's and that by Garnett and Gosse, as well as Saintsbury's 'Elizabethan Literature,' should also be consulted. An excellent edition of Johnson's life, the merits of which should not be underrated, is now provided in Dr. Birkbeck Hill's edition of the 'Lives of the Poets,' in three volumes (1905). WILLIAM P. TRENT,
Professor of Literature, Columbia University.

Milton, Fla., town, county-seat of Santa Rosa County; at the head of Blackwater Bay, which opens into Pensacola Bay, and on the Louisville & Nashville railroad; about 18 miles north by east of Pensacola. The industries of the town are chiefly connected with ship-building and lumbering. It is the seat of Santa Rosa Academy and it has a public library which contains about 5,500 volumes. Pop. (1910) 831.

Milton, Mass., town in Norfolk County; on the Neponset River, and on the New York, N. H. & H. railroad; about six miles south of Boston. The first permanent settlement was made in 1637, but Milton was at first a part of Dochester; it became a separate town in 1664. Within the town limits are the villages of East Milton, Blue Hill, Matapan, and Lower Mills. The chief industrial establishments are the chocolate factory, which has 500 employees; the paper factory, 100 employees; the bakeries 100 employees; and in the granite works about 400 employees. Other industries are connected with manufacturing crackers, cement, rubber goods, and the raising and marketing of garden stuff. Milton is a residential suburb of Boston and the seat of the Milton Academy. The town has one public library, the Milton Convalescent Home, the Leopold Morse Home, and seven fine church edifices. It has also a station of the United States Meteorological Bureau and an Observatory located on the crest of Blue Hills. The one bank has a capital of $100,000, and its business amounts to about $700,000. The town is governed by town meetings. It has been the home of two colonial governors of Massachusetts; one Thomas Hutchinson, the historian, the other Jonathan Belcher, who was also colonial governor of New Jersey. Pop. (1890) 4,278; (1900) 6,578; (1910) 7,924. Consult Teele, 'History of Milton, Mass.'

F. A. LOWELL,
Editor 'Milton Leader.'

Milton, Pa., borough in Northumberland County; on the Susquehanna River and the Pensylvania Canal, and on the Philadelphia & Reading and Philadelphia & Erie division of the Pennsylvania R.R.'s; about 66 miles north of Harrisburg. It was settled in 1768 by Marcus Hulings, and laid out in 1792 by Andrew Straub. It was incorporated as a borough in 1816. Milton is a manufacturing place; the chief industrial establishments are the car works, which have 525 employees; iron mills, with 950 employees; machine-shops, 175; knitting and spinning mills, 320; bamboo furniture factories, 80; nail mill, 100; and other manufactories employing about 450 persons. The industries are all of home development; the report of the factory inspector shows that Milton has the largest per cent of population wage earners in the State. There are 11 churches and good public schools. The three banks have a combined capital of $400,000. The government is vested in a burgess and a council of 15 members elected for three years. About 90 per cent of the population are Americans. Pop. (1900) 6,175; (1910) 7,460.

WM. P. HASTINGS,
Editor 'Evening Standard.'

Milton College, in Milton, Wis., a coeducational institution, founded in 1844 by the Seventh Day Adventists as Du Lac Academy; in 1848 the name was changed to Milton Academy, and in 1867 it was incorporated as a college. In 1910 there were reported 14 professors and instructors; 147 students; about 7,425 volumes in the library; grounds, buildings, and apparatus valued at $36,000; productive funds, $135,000; total income about $16,800 per year. In 1910 the benefactions were nearly $3,000. The number of graduates was (1910) about 350.

Milwaukee, mĭl-wâ'ke, Wis., capital of Milwaukee County and the metropolis of the State; on the west shore of Lake Michigan, at the confluence of three rivers — Milwaukee, Menomonee and Kinnickinnic. The converging streams flow into a bay of great natural beauty, which extends nearly three miles inland and affords excellent harborage for vessels within the shelter of two miles of breakwater constructed by the Federal government.

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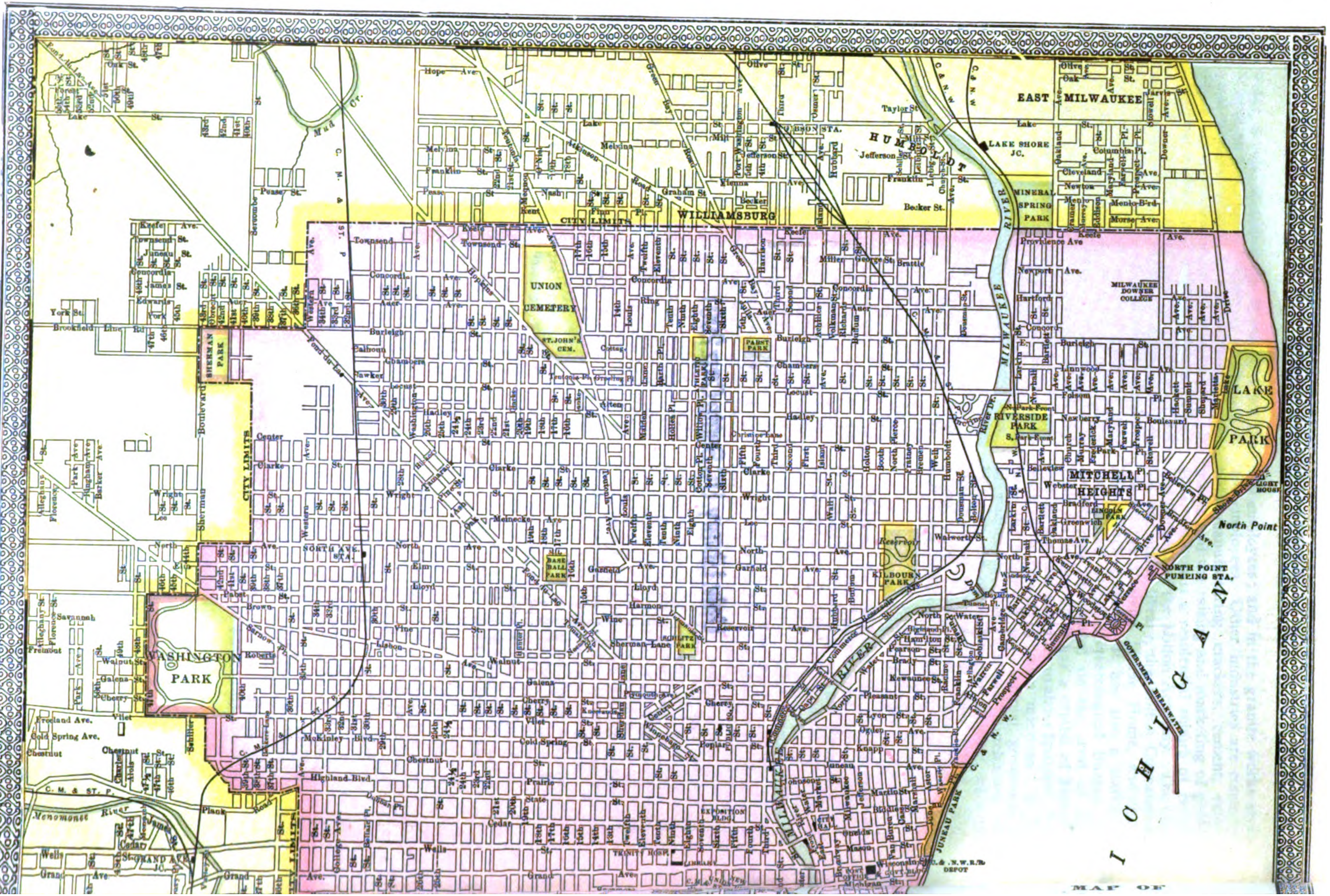
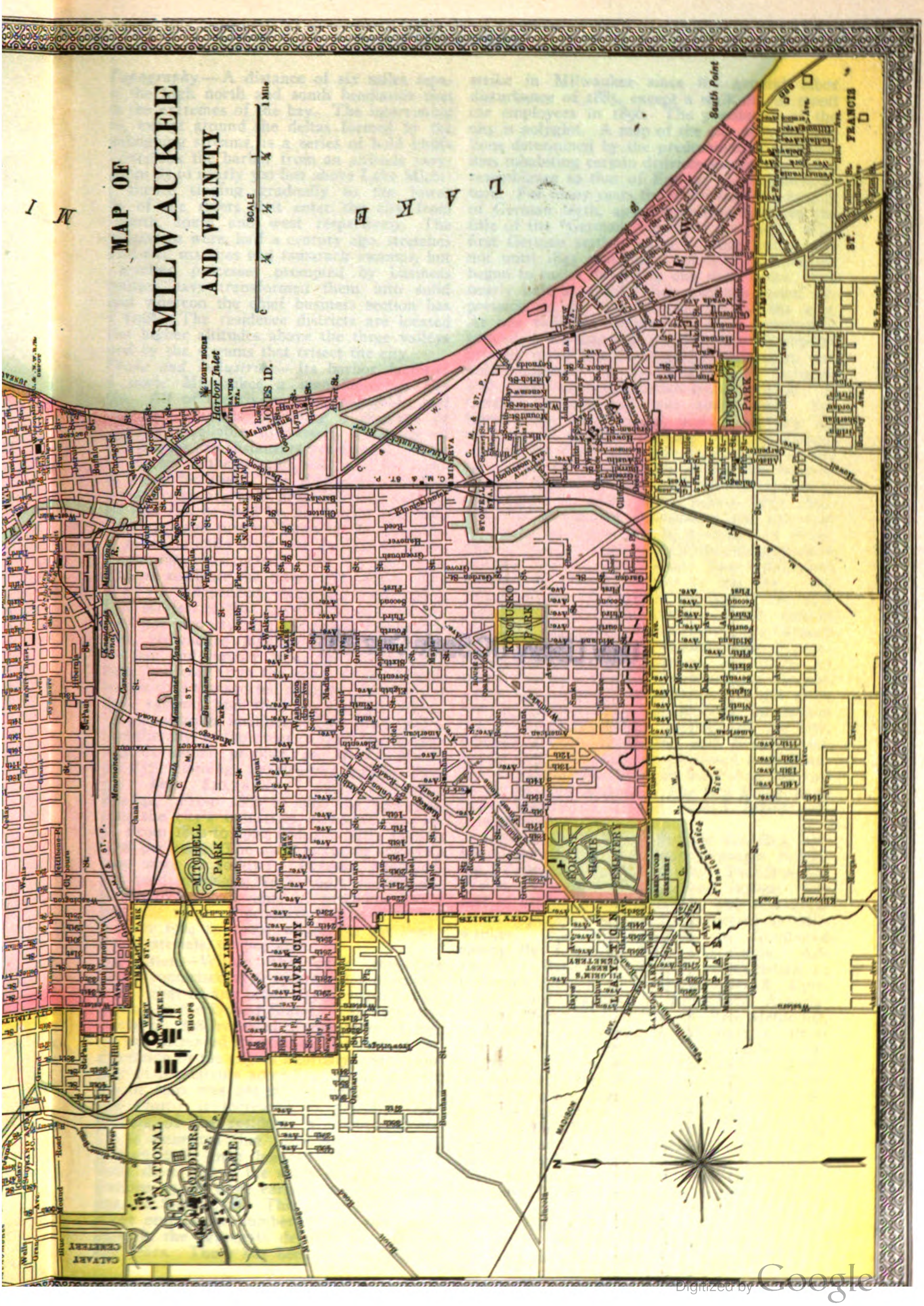

MAP OF
LAKE MICHIGAN
EAST MILWAUKEE
HUMBOLDT
WILLIAMSBURG
LAKE SHORE JC.
MINERAL SPRING PARK
MILWAUKEE RIVER
MILWAUKEE DOWNER COLLEGE
LAKE PARK
LIGHT HOUSE
North Point
NORTH POINT PUMPING STA.
MITCHELL HEIGHTS
LINCOLN PARK
RIVERSIDE PARK
Reservoir
KILBOURN PARK
GOVERNMENT BREAKWATER
JUNEAU PARK
C. & N. W.
C. & N. W. R.R. DEPOT
C. M. & ST. P.
UNION CEMETERY
ST. JOHN'S CEM.
PABST PARK
BASE BALL PARK
SCHLITZ PARK
EXPOSITION BLDG.
CITY HALL
TRINITY HOSP.
LIBRARY
CITY LIMITS
SHERMAN PARK
WASHINGTON PARK
NORTH AVE. STA.
Menomonee River
GRAND AVE. JC.
Mud Cr.


MAP OF
MILWAUKEE
AND VICINITY
SCALE
¼ ½ ¾ 1 Mile
LAKE
M I
South Point
Harbor Inlet
LIGHT HOUSE
LIFE SAVING STA.
JONES ID.
BAY VIEW
HUMBOLDT PARK
KOSCIUSKO PARK
MITCHELL PARK
FOREST HOME CEMETERY
SILVER CITY
NATIONAL SOLDIERS HOME
CALVARY CEMETERY
PILGRIM'S REST CEMETERY
GREENWOOD CEMETERY
ST. FRANCIS
CITY LIMITS
Menomonee R.
Kinnickinnic River
Kinnickinnic Ave.
Burnham Canal
South Menomonee Canal
Kneeland Canal
C. M. & ST. P.
C. & N. W.
MILWAUKEE CAR SHOPS
MINERVA
STOWELL STA.
N

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Topography.— A distance of six miles separates the high north and south headlands that mark the extremes of the bay. The intervening shore, except around the deltas formed by the disemboguing streams, is a series of bold bluffs that overlook the harbor from an altitude varying from 85 to nearly 300 feet above Lake Michigan, thence sloping gradually to the lower levels of the rivers that enter the city from the north, south and west respectively. The river bottoms were, half a century ago, stretches of wild-rice marshes and tamarack swamps, but the leveling processes prompted by business necessities have transformed them into solid ground whereon the chief business section has been built. The residence districts are located on the higher altitudes above the three valleys formed by the streams that trisect the city.

Trade and Industries.— Its harbor facilities have made Milwaukee a manufacturing city chiefly. All of the rivers being navigable, and the present channels supplying a dockage of 25 miles available to vessels, hundreds of manufacturing establishments are located on the upper reaches of the streams, with slips for additional vessel facilities. The Milwaukee and Menomonee rivers are each provided with turning basins that can be used by the largest lake vessels, and a large turning basin in the Kinnickinnic River, a mile from the harbor entrance, will soon be constructed. The deepest draft vessels can navigate the rivers and canals. The fleets of six independent steamship lines, and a fleet of car-ferries that is operated uninterruptedly all the year, furnish the water transportation to Milwaukee manufacturers. Iron and copper ore and lumber from the Great Lakes districts, and coal from the mines of the Middle States are thus transported cheaply. Three great railroad systems and their connections supply rail transportation facilities. The chief industries of the city, in the order of their importance as regards annual product, are these: Metal, $79,776,837; clothing, $26,763,576; leather, $24,235,307; beer, $20,730,200; other industries, $78,810,642. From 1880 to 1890 the total product of the city's industries increased 147 per cent. From 1890 to 1900, 88.6 per cent; 1904 to 1909, 16 per cent. The manufacturing statistics in 1909 were as follows: Persons employed, 67,461; paid in wages, $40,842,000; capital employed, $219,391,000; value of products, $208,324,000; the value of products increased 51 per cent from 1904 to 1909; wages, 53 per cent; cost of materials, 69 per cent.

Population.—Within the city's corporate limits are comprised 23½ square miles, a smaller area than that of any other city of considerable population in the United States. The first enumeration, in 1838, revealed a population of 700, which had increased to 9,666 by the date of the incorporation of the city in February, 1845. The number of inhabitants according to the Federal census of 1900 was 285,370. During the next decade (1910) it increased to 373,587. The great bulk of the residents are workingmen, and it is estimated that fully 80 per cent of them own their own homes. Local banking statistics show that in the seven savings deposit institutions 35,570 wage earners have aggregate deposits of $10,517,123. This is an increase of 74.52 per cent in the number of depositors and of 93.65 in the aggregate deposits in a period of five years. There has been no considerable strike in Milwaukee since the general labor disturbance of 1885, except a walk-out of street car employees in 1896. The population of the city is polyglot. A map of the city with division lines determined by the predominating nationalities inhabiting certain districts would bear much resemblance to that of Europe as to nomenclature. For many years the population was largely of German birth, and Milwaukee acquired the title of the «German Athens of America.» The first German settlers came in 1838, but it was not until 1845 that large numbers of Germans began to make the young city their home. For nearly half a century their customs found expression in the chief social life of the city. At one time the number of daily newspapers printed in German was nearly twice the number printed in the English language. A theatre was built expressly for performances in German, with stock companies drawn from Germany. A German market hall was constructed. Six turner halls were erected, and a seminary for students of physical training was established. During the Civil War, one company of volunteers was composed wholly of German turners. German instruction has been part of the daily programme in every public school since 1857. The tide of German immigration was followed, beginning 30 years ago, by a stream of Poles, Dutch, Scandinavians and Bohemians, and more recently Italians and Syrians have established colonies in certain sections of the city. The preponderance of German population has now disappeared, although certain wards remain solidly German, and a German theatre, a German market place, flourishing organizations of turners, German musical societies, and places of amusement and recreation distinctively German attest the perpetuity of customs brought from the fatherland. The foreign-born inhabitants are grouped in various sections of the city. German, Polish, Bohemian and Scandinavian papers and periodicals are published in Milwaukee, including two dailies in the Polish and two in the German language. The first Polish daily paper established in the United States was printed here.

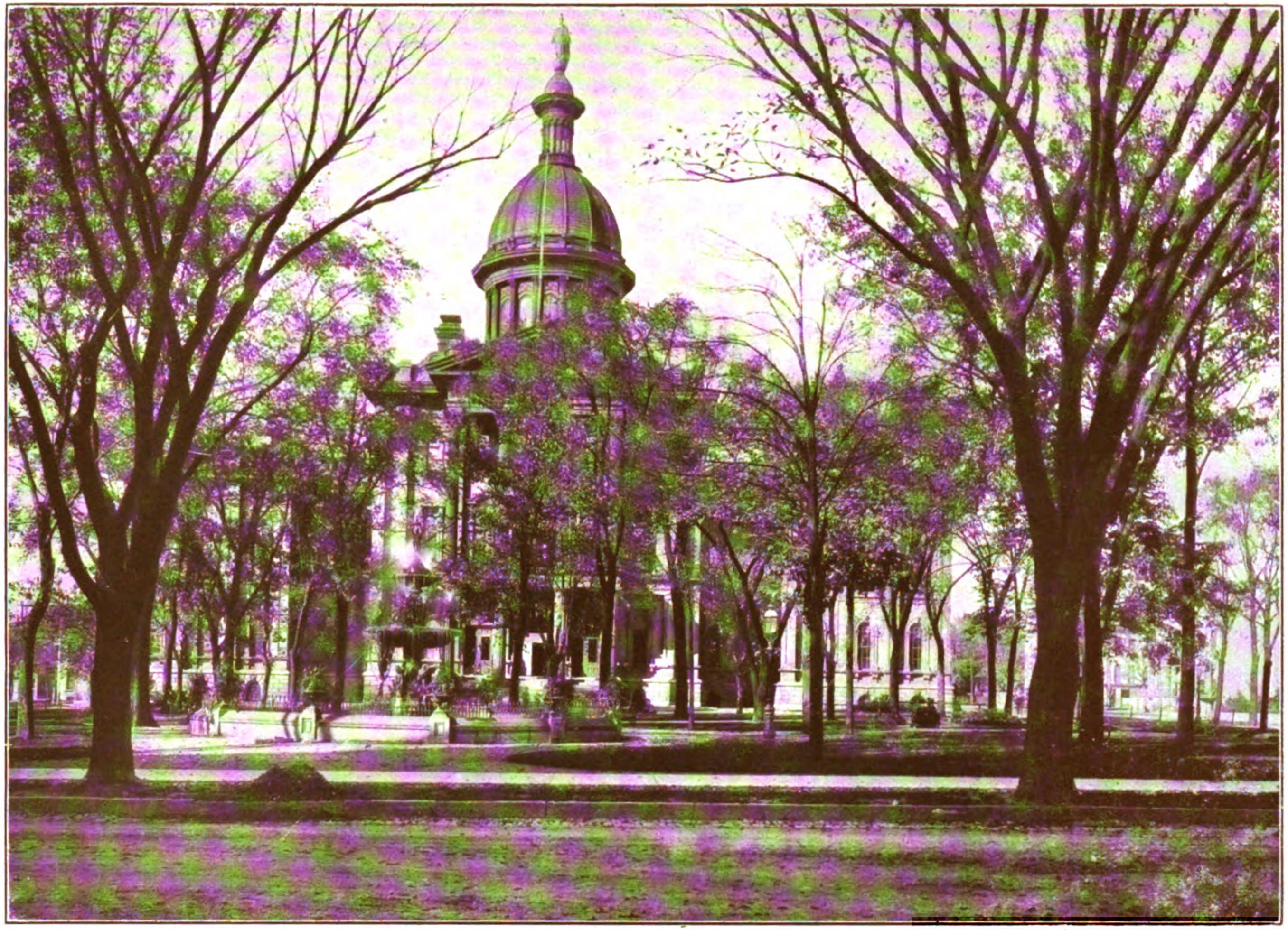
Churches.— In 82 of the 162 churches, sermons are preached in foreign languages, including German, Polish, Dutch, Scandinavian, Welsh, Bohemian, Russian and Italian. The seat of a Catholic archbishopric and of a Protestant Episcopal bishopric are located in Milwaukee. The 162 churches are distributed among the following faiths and creeds: Adventist, 1; Baptist, 9; Catholic, 31; Christian, 1; Christian Science, 4; Congregational, 8; Episcopal, 12; Evangelical, 7; Evangelical Association, 6; Jewish, 6; Lutheran, 38; Free Methodist, 2; Methodist Episcopal, 18; Mormon, 1; Presbyterian, 11; Reformed, 2; Spiritualistic, 2; Unitarian, 1; Theosophist, 1; Salvation Army barracks, 1; People's pulpit, 1. The property of the religious organizations is valued by the tax commissioner's department at $6,411,940. Some of the church edifices are architecturally beautiful, notably Saint Paul's Church, in the Norman style; Saint Josaphat's, Byzantine; Gesu, Immanuel and Saint James, Gothic. The convent of Notre Dame, which occupies a square in the heart of the city, is the mother house of the Order in the United States. In the suburb of St. Francis, the Catholic seminary of Pio Nono is surrounded by a magnificent tract of 200 acres. Marquette College (Catholic) and Concordia College (Lutheran) are located on the West Side.

Government.— The elective city officers are a mayor, treasurer, comptroller, attorney and a common council consisting of two aldermen from each of the 23 wards, chosen biennially. The administrative functions are vested in appointive boards whose titles indicate their duties: Board of school directors (23), board of public works (4), public debt (3), city service commission (4), fire and police commission (4), school commission (4), public library board (9), public museum board (9), park board (5), emergency hospital board (9). All of the boards and commissions with a membership of four are required by law to be bi-partisan. Certain features of their administration and organization are peculiar to Milwaukee. The total number of persons in city service is 3,111, and 2,923 of these are under civil service rules with tenure of office during good behavior, leaving but 188 persons, including elective and honorary officers, not subject to such rules. The city service employees affected by city service laws are in the following departments: Under the board of city service commissioners, 1,312; under the board of fire and police commissioners, 659; under the board of school directors, 952. The firemen and policemen were prior to 1885, when a bi-partisan board was created, removable for political causes; the official and labor service was placed within the shelter of a bi-partisan board's rulings in 1895; the school department has not been affected by politics since 1897. The school board organization is peculiar to Milwaukee. The school commission is bi-partisan, the mayor appointing one member of the four annually. Their sole duty is to select one third the membership of the board of school directors annually on a strictly non-partisan basis. The library and public museum boards are composed of three aldermen and six «citizen members» each, the library board electing its members as terms expire, except the aldermanic contingent, whom the mayor appoints.

Public Works.— Some advanced theories in municipal ownership and administration have found a footing. The waterworks property, valued at $5,154,617, is owned by the city, the entire cost of construction and maintenance having been paid out of its proceeds, and its large surplus revenues now aid in defraying other municipal expenditures. A crematory for consuming garbage, which is collected by the health department, is also owned by the city. A free emergency hospital, originally a private benefaction, is maintained at public expense, likewise three large natatoriums all the year through, and in the summer free public bath houses on the lake beach and swimming schools on the upper Milwaukee River. In many of the public parks, of which there are 21, partly with boulevard connections, free public concerts are given semiweekly. The total acreage of these parks is 571. Ten of them vary from 20 to 150 acres in extent, the others being small breathing spots distributed in various parts of the city. During six winter months, free public evening lectures for adults are given in public school halls, the expense being borne by the school fund. The city owns exposition grounds, though the building located upon them is the property of a quasi-private corporation. A city-hall was completed in 1896 at a cost of $1,200,000, and a library and museum building is valued at $1,168,000, with contents. The library comprises 150,000 volumes. There are 239,291 specimens in the museum, including a remarkable collection of 5,244 different kinds of birds' eggs and nests, and of 2,529 arms and military accoutrements representing all nations and eras. Among the notable public works is a flushing tunnel connecting the Milwaukee River with the Lake, water being pumped from the Lake into the stream in such quantities (17,412,735,371 gallons last year) as to cleanse the channel whenever required to prevent offensive conditions. A system of intercepting sewers paralleling the streams has been partly constructed.

Education.— There are 54 public schools, including a school for the deaf-mutes and four high schools. The total enrolment is 36,000. A State Normal school, with an enrolment of 300 students, is the main source of supply for the teaching corps. Every primary and district school in the city, with two exceptions, has a kindergarten department, Milwaukee having been the pioneer city in the United States, a quarter of a century ago, to institute kindergarten instruction as part of the regular work in every school building below the high school grade. There are 71 parochial and private schools with a total enrolment of nearly 22,000. In addition to the institutions heretofore mentioned, the Milwaukee-Downer College for young women is located here, in a group of buildings recently completed in the northern suburban district near Lake Michigan. Part of its endowment is obtained from an organization of 600 women known as the College Endowment Association, who conduct annually series of University Extension lectures for their own members in the Athenæum building. The Athenæum is owned by the Woman's Club, was built by them and is maintained as a successful business venture by them. The Layton Art Gallery, managed through a board of trustees, is open to the public without admission charge, and is the gift of Frederick Layton. The Johnston Emergency Hospital building was given to the city by John Johnston.

History.— The first permanent settlement of Milwaukee is usually dated from 1818, when Solomon Juneau erected his little log cabin on the east side of the Milwaukee River. French and English traders had been here before that date, and a procession of Jesuit priests and French voyageurs had preceded them. The first recorded visit of a white man on the site of the future city is in the journal of Father Zenobe Membré, a Recollet missionary priest who accompanied Robert Cavalier de la Salle on his memorable exploratory trip from Lake Erie to the Illinois country in 1679. He notes that both Mascoutens and Foxes were dwellers «on the banks of the river called Melleoki.» John François Buisson de Saint Cosme journeyed in 1699 along the west shore of Lake Michigan from Michilimackinac to the Mississippi. «On the seventh,» he wrote, «we arrived at Melwarik (Milwaukee). This is a river where there is a village which has been considerable and inhabited by the Mascoutens and Foxes, and even some Pottawattamies.» The word Melleoki and its numerous variants which by a process of evolu-



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tion has become Milwaukee, is of Pottawattami origin and signifies "good land." Another definition accepted by some historians is "council place," this having been regarded as neutral territory by different tribes of Indians. The dwellers in the old Indian village were evidently a turbulent set, for Colonel Arent de Peyster, commandant at Michilimackinac, wrote of them in the early years of the Revolutionary War as "runagates — a horrid set of refractory Indians." Lieutenant James Gorrell, whose British regulars occupied the stockade at Green Bay in 1762 and gave it the high-sounding title of Fort Edward Augustus, wrote the name of the place as "Milwacky." An English trader lived among the Indians at this place in that year. Fur traders made brief stays in the village from time to time. Alexander Lafromboise and his brother were located as traders here in 1785, with a large stock of goods. In 1795 Jean Baptiste Mirandeau, a Canadian blacksmith who had married an Indian woman, built a cabin and made himself useful to the Indians by mending their firearms. He received as compensation game and furs. He died in 1819, being survived by a family of 10 children, who joined the Indians when the Milwaukee band was removed. Thomas Gummersall Anderson, the son of a Loyalist, was a resident upon the site of the future city of Milwaukee from 1803 till 1806. He took an active part in the capture of Prairie du Chien by the British during the War of 1812. When Solomon Juneau arrived in 1818, he found a Pottawattamie village. He settled on the east side of the Milwaukee River, which later was called Juneautown; the west side of the river became Kilbourntown, after Byron Kilbourn (1834), and George H. Walker gave the name of Walker's Point (1834) to the region south of the Menomonee River. Each of the three natural geographical divisions became the nucleus of a little community, and acrimonious rivalry was a natural resultant. The different names of streets on opposite sides of the rivers, now connected by 28 bridges, are a survival of the bitter feelings then engendered. The village of Milwaukee, now the East Side, was organized 27 Feb. 1837; Kilbourntown, now the West Side, was annexed 11 March 1839; and Walker's Point, now the South Side, 5 Feb. 1845. The city was incorporated 5 Feb. 1845, and Solomon Juneau chosen the first mayor.

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HENRY E. LEGLER,
Secretary Parkman Club.

Mime, a dramatic entertainment, native to Sicily and Magna Græcia, and appealing to popular taste by its scurrilous caricatures of low life. Originally performed in public squares on festival days, it was later developed into artistic form by Sophron Syracuse in the fifth century B.C. The newly discovered *Mimiambi* of Herondas (q.v.), a Greek poet of perhaps the latter half of the third century B.C., representing the every-day life of the common people, give us probably a trustworthy idea of these literary mimes. The Romans adopted the mime in its unliterary form as early as the third century B.C., but it was not until Cicero's time that it received a place in literature at the hands of Decimus Laberius and Publilius Syrus, of whose works we have fragments. As an after-piece, and under the Empire as an independent performance, it was as popular as it was indecent in words and action.

Mimicry, in Nature. Mimicry is a technical term in the language of the exponents of organic evolution (q.v.) to indicate the gradually assumed and unconscious resemblance of given animals to others, due to the fact that by such a disguise, or resemblance to the former in shape, color, markings, mode of motion or other characteristics, the latter secure certain advantages in the struggle for existence. Such a gradually assumed resemblance, regarded as the result of a process of natural selection, is called "mimicry" or "imitation," although of course it is wholly unintentional on the part of the creatures themselves. Many animals, particularly among the insects, are imitated, because by reason of an unpleasant taste or odor, or of their excessively hard shells, they are rejected by insectivorous birds, reptiles, and mammals. On this account they are generally adorned with gay colors or are luminous at night, to make themselves recognizable even at some distance; and such display themselves leisurely, boldly and openly, before all eyes. To them belong entire families,— for example, among butterflies the danaids (q.v.) and heliconids, and among beetles the fireflies; which, accordingly, are imitated even in their frequently brilliant colors and markings by butterflies and beetles of other classes, whose kindred otherwise are subjected to a bitter persecution. Sometimes one particular prototype is followed by several imitators of wholly different classes, which associate themselves in a swarm with the former. Another category of animals often imitated is that of those provided with a formidable weapon, for example, wasps and ants, as well as individual poisonous snakes.

The phenomenon is most striking when animals of wholly different orders take part in the same imitations, for example, wasps and bees are imitated by butterflies, beetles, flies, orthopterans, and hemipterans, or ants by beetles, locusts and chinch-bugs. Poisonous snakes are not only mimicked by harmless snakes, but also by large caterpillars. In individual instances parasitic insects also appear to imitate their hosts, and then creep unrecognized into their nests; and even among plants it is believed that analogous phenomena can be demonstrated, for example, the imitation by so-called dead-nettles of the nettle avoided by cattle in pasture.

In an expanded sense, to mimicry is commonly assigned also the imitation of unrelishable, inanimate objects, as, for example, that of withered, gnawed and mold-covered leaves by butterflies or locusts, of bits of twig, particles of dung, cocoons whose contents are breaking out; or even the imitation, serving the mere purpose of concealment, of objects under and upon which an animal seeks refuge, for example, of green twigs and leaves, lichen-grown stones, barks, etc. This phase of the matter is coming to be more often distinguished, however, as «protective resemblance.» A comprehension of the factors by which these imitations, frequently carried out to the most minute details and leading to the most complete deception, are produced, first became possible through Darwin's theory of natural selection; and above all it was the naturalists Bates and Fritz Müller who first furnished suitable explanations of the relations and processes concerned. It should be added, however, that the most recent study has discredited some of the conclusions of the earlier enthusiasts and has attributed many observed resemblances and parallelisms to other causes and influences.

Consult the writings of Fritz Müller, Darwin, Wallace, Bates, Belt, and the volumes of the ‹Cambridge Natural History› (1895–1903).

Mimir, mē'mĭr, in Scandinavian mythology, the god of wisdom, and most celebrated of the giants.

Mimnermus, the earliest writer of Greek erotic elegy, was born in Colophon or Smyrna, and lived in the last half of the seventh century B.C. His collection of love-poems, called ‹Nanno› from the name of a flute-player whom in his old age he courted in vain, survives only in fragments which may be read in a separate edition by N. Bach (Leipsic 1826) or in Bergk's *Poetæ Lyrici Græci*.

Mimo'sa, a genus of herbs, shrubs, trees, and a few climbing species of the natural order *Leguminosæ*. The species, of which more than 200 have been described, are natives principally of the American tropics. They have pinnate leaves, usually spicate clusters of small flowers, followed by flat, oblong or linear pods which when ripe break into one-seeded joints. Many of the species are noted for their sensitive leaves which at nightfall close and droop. Others respond to a touch. Of these the humble or sensitive plant (*M. pudica*) is perhaps the best known.

Mi'na, an ancient Greek denomination of money. The Attic mina contained 100 drachmæ, and was valued at about $16.

Mina-bird, or **Myna,** a starling or grakle (*Eulabes religiosa*), very familiar throughout India and eastward, nestling confidingly in gardens. Its color is a deep velvety black, with a white mark on the base of the quills of the wing. The bill and feet are yellow, and there are two yellow wattles on the back of the head. The Hindus regard it as sacred to Ram Deo. Certain other similar species are also called mynas in some localities.

Minæ'ans. See SABÆANS.

Min'aret (Arabic, *minarat*, a lantern), a tower generally surrounded with balconies, and erected in connection with the mosques in Mohammedan countries, from which the muezzin summons the people to prayer and announces the hours, bells not being used by the Moslems. See MOSQUE.

Minas, mē'näs, or **Bello Horizonte, Brazil,** the capital of the state of Minas Geraes, 60 miles northwest by rail of Ouro Preto, which it replaced as the administrative seat in 1894. It is a modern town with wide streets, electrically lighted, and adorned with handsome public buildings, elegant residences, and fine parks. Pop. 29,000.

Minas, Uruguay, the capital of the department of Minas, 56 miles by rail northeast of Montevideo. It carries on a trade in the produce of the surrounding agricultural region, and in the marble and granite of the neighboring quarries. Pop. 4,700.

Minas Geraes, mē'näs zhā'rĭs, Brazil, a southeastern state bounded north by Bahia, east by Bahia and Espirito Santo, south by Rio de Janeiro, and São Paulo, southwest by São Paulo, and west by Goyaz; area, estimated at 222,160 square miles. The surface is mostly mountainous, and though lying within the tropics its elevation renders the climate temperate and healthful; but the low tracts are periodically flooded, and contain extensive swamps and pools. It is rich in minerals, gold, silver, platina, copper, lead, diamonds, rubies, and other precious stones being found. Extensive iron-works have been erected in the neighborhood of Ouro Preto. Sugarcane, cotton, millet, tobacco, and coffee are cultivated. The cultivation of cereals is extensive, and the finest European fruits have been introduced. Vast herds of cattle and swine feed in the pastures and forests. Timber and dye-woods of the most valuable kind, together with numerous varieties of gums, balsams, and medicinal plants, grow freely in the latter. Some trade in home manufactures, and an extensive foreign commerce, have been established. For administrative purposes Minas Geraes is divided into fourteen comarcas. It sends twenty members to the general assembly, and ten to the senate. The provincial assembly is composed of 36 members. It sits at Minas (q.v.) since 1894 when the administrative seat was removed from Ouro Preto. Pop. about 3,300,000.

Minch, The, Scotland, the channel off the northwest coast between the mainland and the island of Lewis; it is above 30 miles wide, and on either side are numerous lochs or sea-arms penetrating inland. It is connected with the Sea of the Hebrides on the south by the Little Minch, the channel between the island of Skye and Long Island; its narrowest part is about 15 miles wide.

Mincio, mĭn'chō, Italy, a river, the ancient Mincius, which flows from the south extremity of Lake Garda, near Pescheria, and after forming the lake and marshes that surround Mantua, falls into the Po eight miles below the city. Its banks are remarkably fertile, and celebrated for their beauty by Virgil, who was a native of this country. It formed an important base of operations in the wars between France and Austria. The length of its course is over 100 miles.

Mind. See PSYCHOLOGY.

Mind-cure. See MENTAL SCIENCE; SUGGESTION.

Mind Reading. See HYPNOTISM; ANIMAL MAGNETISM; TELEPATHY.

Mindanao, mēn-dä-now', Philippines, the most southeastern and largest island of the archipelago, lying between lat. 5° 35' and 9° 50' N. and between lon. 121° 53' and 126° 28' E., northeast of Borneo. It is bounded on the east by the Pacific Ocean and on the west by the Sulu Sea; area 45,356 square miles; with its dependent islands 46,521 square miles.

Topography and Climate.— The outline of the island is very irregular, and the coast is uneven and much indented with deep bays and inlets; the shore line is 1,592 miles, and the width of the island from east to west 386 miles. The island is very mountainous particularly in the interior, the mountain system consisting of a number of irregular ranges extending generally north and south, and as a rule approaching near the coast. The mountain formation shows the effect of earthquake and volcanic action, and there are many volcanoes, some of which are active. The principal peaks are Apo (10,312 feet), near the southeastern coast, and Malindang (8,560 feet) in the northwest. The island is drained chiefly by two large rivers, the Grande de Mindanao (q.v.), flowing southwest and west, on the western side of the central mountain range, and the Butuán or Agusán, flowing northwest, on the eastern side of the same range. There are numerous other smaller streams and nine large mountain lakes. There are iron springs at Placer, in the province of Surigao; sulphur springs at Mainit, Surigao, and Balingasag, Misamis, and medicinal thermal springs at Malībato. As the island is within 10° of the equator, the climate is hot and humid, but more equable than that of Luzon; rains are frequent and heavy.

Forests and Fauna.— The island is covered with forests of valuable woods for ship- and house-building and furniture making; among these are the molave narra, (similar to the yellow pine), teak, ebony and cypress; the gum and resin producing trees and medicinal and dye plants also grow abundantly. Animal life is abundant in these forests; over 200 species of birds have been classified of which 17 species are peculiar to Mindanao and Basilan; deer, wild hogs, monkeys, and the haguang or colugo (q.v.) are numerous. Reptiles, including the giant lizard, iguana, and large snakes, particularly the boa, also infest the forests and crocodiles the river.

Industrial Resources.— The staple agricultural products are rice, sugar, cotton, corn, tobacco, indigo, coffee, and hemp; in 1899 Mindanao ranked fifth among the hemp-producing sections of the Philippines; other products of special value are cloves, nutmegs, cinnamon, and other spices, betel nuts and betel peppers. The most important industry is the cultivation and shipment of hemp, and forest products; large herds of cattle and horses are raised; and there is a little weaving of hemp and cotton fabrics for home use. Edible birds' nests are also gathered and exported. Communication is largely by water, as there are few roads except in the immediate vicinity of the chief towns, and the towns and villages are situated on the coast or on the large lakes and rivers. Gold is obtained in small quantities by the natives, and is doubtless abundant; coal, sulphur, copper and platinum are also reported.

People and Government.— Mindanao is peopled mostly by tribes of the Moro race, among whom the Mohammedan religion is dominant; Visayan peoples inhabit the provinces of Misamis and Surigao. The island was first occupied by United States troops in 1899, and since that time numerous garrisons have been established, and operations carried on with a view of regulating intercourse between the Filipinos and Moros, and of gaining the confidence of the people. The provinces of Misamis and Surigao were placed under civil government in 1901, the rest of the island remained under military control until June 1903, when a law was passed by the Philippine Commission, providing civil government for Mindanao (exclusive of the two provinces mentioned above) and its adjacent islands, under the name of the Moro Province. Pop. 495,660. See PHILIPPINE ISLANDS; MOROS.

Mindanao, Grande de, grän'dā dā mēn-dä-now', a large river of the island of Mindanao, Philippines. It rises in the Rangayán Mountains, flows south to the Lake of Liguasan, and passing through this lake flows northwest to Illana Bay. About 25 miles from its mouth it divides into two branches, which enter the bay about five miles apart, with a large delta between them; the north arm is the larger and more navigable; the south arm is narrow and only five feet in depth. The river is navigable for 70 miles for small vessels not drawing over four feet. Its course is mostly through a very fertile region, and it drains an extensive plain with several large lakes; in length and volume it is the largest river of the Philippines. In the upper part of its course it is known also as the Pulangui.

Min'den, Neb., city, county-seat of Kearney County; on the Chicago, Burlington & Quincy railroad; about 120 miles west by south of Lincoln. It is in a fertile agricultural region in which stock raising is also a prominent industry. It has considerable trade in wheat, corn, hay, and live-stock. There are 3,500 volumes in the public school library. The population in 1910, 1,559.

Minden, Prussia, a town of Westphalia, on the left bank of the Weser, 35 miles southwest of Hanover. It is one of the oldest towns in Germany, and the streets in the ancient parts are narrow and crooked. It has a fine cathedral of the 13th century, in the early pointed Gothic style, a gymnasium, and an orphan hospital; manufactures of tobacco, chicory, chemicals, soap, lamps, machinery, etc., and an important transit and general trade. In 1759 the French were defeated here by an Anglo-Hanoverian army during the Seven Years' war. Pop. about 28,000.

Mindoro, mēn-dō'rō, Philippines, an island lying south of Luzon, a little north of the centre of the archipelago; length northwest to southeast, 110 miles; width, northeast to southwest, 56 miles; area, 4,050 square miles, with dependent islands, 4,108.

The island is mountainous, the general topographical features consisting of several high broken ranges forming an elevated plain in the interior; and from this plain sierras extend in different directions toward the coast, which is mostly low and marshy, especially on the north and east; on the west coast along Mindoro Strait is prairie land. The culminating point of the mountain system is Halcón Mountain in the north (8,800 feet). There are numerous small rivers, but no general river system of main stream and tributaries. The climate is variable; the rainfall heavy and monsoons frequent; the western coast is temperate and healthy, but the northern and eastern coasts are hot.

At one time, before the decay of the Spanish monarchy, the rice yield was so abundant that Mindoro was called «the granary of the Philippines»; but the frequent attacks of Moro pirates destroyed the prosperity of the island, and the agricultural products are now unimportant, being almost entirely for home consumption. Rice, sugarcane, cocoa, tobacco, hemp, cotton, etc., are raised; the cultivation of hemp is increasing, and a small amount of cotton is exported to the island of Ipil. In the time of the early Spanish explorers reports of great mineral wealth, especially gold, were circulated; the real mineral resources are but little known, though as far as modern exploration has gone copper, gold, and coal have been found. The island is heavily wooded, and its chief commercial wealth is in forest products; the trees include cedar, ebony, mahogany, gum trees, gutta-percha, palms and dye woods. Near the principal towns woodcutting and rattan splitting for the Manila market is the chief industry; rattan, buri, honey, forest gums, balao oil, pitch, and other forest products are the chief articles of export; tortoise-shell, obtained from the small neighboring islands, and canoes cut from a single piece of wood are also exported; and there is a considerable production of sago. There are only a few roads, access to inland villages being by mountain trails or by river-canoes; the local trade between coast towns is carried on mostly by native sailing craft; all exports for Manila and other islands are concentrated at ports of call for steamers.

In June 1902 civil government was extended to Mindoro and adjacent islands, and it was detached from the province of Cavité and made a sub-province of Marinduque (q.v.). The inhabitants of the interior are wild tribes, among whom the Manguianes predominate; the people of the north coast are mostly Tagálogs, those of the south coast, Visayans. Pop., estimated to include wild tribes of interior, 106,200.

Mine Gas, the same as fire-damp (q.v.).

Mine Run, Campaign of. On 7 and 8 Nov. 1863 Gen. Meade crossed the Rappahannock at Kelley's Ford and Rappahannock Station (qq.v.), and concentrated his army of 70,000 men in the vicinity of Brandy Station, Gen. Lee, with 50,000 men, withdrawing beyond the Rapidan to an intrenched line, the left of which covered some of the fords of the river, the right being perpendicular to it and extending to Bartlett's Mill on Mine Run. On 26 November Meade began the Mine Run campaign by sending the First, Fifth, and Second corps to cross the Rapidan at Culpeper Mine and Germanna fords, and the Third and Sixth corps to cross at Jacob's Mill, all five corps to converge upon the old turnpike and the plank-road near Robertson's Tavern, both leading to Orange Court House, and turn the right of Lee's position. An early start was made on the 26th, but owing to delay in some of the columns, all were halted for the night but a short distance beyond the river. The march was resumed at daylight of the 27th. The Second corps reached Robertson's Tavern at 10 A.M., to find itself in the presence of a considerable body of Ewell's corps which Lee had hastened there, and it was ordered to remain on the defensive, until the Third corps, followed by the Sixth, came up on the right. But the Third corps was delayed. Lee, on discovering Meade's movement, had promptly ordered Early, commanding Ewell's corps, to move to the right. Part of his command had reached Robertson's Tavern and confronted the Second corps, and Johnson's division was moving in the same direction when it came into collision with the Third corps, on Payne's Farm, and a battle ensued, lasting until dark. Both sides claimed the advantage, but the engagement resulted in a delay to Meade's operations, and, as he claims, the failure of his campaign. The Union loss was 125 killed, 747 wounded, and 71 missing. Lee reported a Confederate loss of 545. The Second corps was severely engaged during the day, and advanced some distance beyond Robertson's Tavern. At night the First corps moved up to the support of the Second. The Fifth corps, which had supported Gregg's cavalry division in an engagement at Parker's store, on the Orange plank-road, was brought over to support the Second, and next morning the Third and Sixth corps came up on the right of the Second. On the 28th Meade advanced to the attack, but on driving in the Confederate pickets it was found that Ewell's corps had fallen back. Pursuit was made, the Second corps in advance, and after a march of two miles Ewell was found in position on the west side of Mine Run. A P. Hill had come up and formed on Ewell's right, covering the Orange plank-road. The line was very strong, and on it were 150 guns. It was after dark when the Second, Sixth, and First corps, with part of the Third, fronted this position. An examination of Lee's position convinced Meade that there was no probability of success in an attack in his immediate front, and he determined to send Gen. Warren, with his Second corps and a division of the Sixth, to feel for Lee's right flank and turn it if practicable. The 29th was spent in reconnoitering and demonstrations, while waiting for Warren's movement. Early in the morning of the 29th Warren started from Robertson's Tavern, crossed over to the plank-road, drove in the skirmishers of A. P. Hill's corps, and late in the day came upon Hill's position across the road. Warren reported to Meade that the conditions were favorable for an attack, and personally assured him that he could carry everything before him. Meanwhile some of Sedgwick's division commanders had discovered weak points on Lee's left, no works being thrown up, and Meade ordered an attack for the morning of the 30th, the right and centre to open with artillery at 8 o'clock, at which time Warren was to make the main attack, and at 9 o'clock Sedgwick was to assault Lee's left with five divisions of the Fifth and Sixth corps. Two divisions of the Third corps were sent to Warren, thus increasing his command to six divisions of 26,000 men. The batteries on the right and centre opened a furious fire at 8 A.M. The skirmishers of the First and Third corps advanced across Mine Run and drove in those of the enemy, and Sedgwick was about to assault when Meade ordered him to desist. He had received a despatch from Warren advising against an attack on Lee's right, as it could not succeed. During the night of the 29th Warren had made dispositions for an overwhelming assault, but on the morning of the 30th he saw on the heights before him a line of strong works thrown up over night, well filled with infantry, and heavy batteries covering the slope up which it was necessary to charge, and therefore he deemed successful attack impossible. Meade rode over to Warren, who proved unchangeable in opinion, and Meade tried to arrange for an attack later in the day, but found it impracticable. The armies remained confronting each other that day and the next, and on the night of 1 December Meade withdrew to his former position beyond the Rapidan. Lee followed part way on the 2d. The Union loss in the Mine Run campaign, 26 November–2 December, was 173 killed, 1,099 wounded, and 381 missing. The Confederate loss was 110 killed, 570 wounded, and 65 missing. Consult: 'Official Records,' Vol. XXIX.; Humphreys, 'From Gettysburg to the Rapidan'; Pennypacker, 'Life of General Meade'; Wather, 'History of the Second Army Corps'; Powell, 'History of the Fifth Army Corps'; The Century Company's 'Battles and Leaders of the Civil War,' Vol. IV.

E. A. CARMAN.

Mine Surveying. See SURVEYING.

Mine Workers of America, United, an American labor organization, formed 25 Jan. 1890, to «unite mine employees that produce or handle coal or coke . . . and ameliorate their condition by means of conciliation, arbitration, or strikes.» Its executive officers are president, vice-president, and secretary-treasurer; a National Executive Board is made up of these officers and of 25 delegates, one each from the various district divisions. The United Mine Workers made great gains in membership by its bituminous strike in 1897, and by the famous anthracite strikes of 1900 and 1902; the two last mentioned strikes were under the leadership of President John Mitchell (q.v.). The policy is typically aggressive and almost the entire funds of the union are used to support strikes and spread the organization. The organ is 'The United Mine Worker.' John P. White was chosen president 25 Jan. 1911.

Mi'ner, Alonzo Ames, American Universalist clergyman: b. Lempster, N. H., 17 Aug. 1814; d. Boston, Mass., 14 June 1895. He was educated in secondary schools, taught for a time, was ordained to the Universalist ministry in June 1839, was pastor at Methuen, Mass. (1839–42) and at Lowell (1842–8), was colleague of Hosea Ballou at Boston (1848–52), and full pastor (1852–62; 1874–95). In 1862–74 he was president of Tufts College (Medford Mass.). He originated the Universalist publishing house, Boston; was chairman of the American Peace Society, which he represented at the international congress, Paris, 1889; was Prohibition candidate for governor of Massachusetts in 1878 and for mayor of Boston in 1893; and was also once known as a lecturer on anti-slavery. He edited the 'Star of Bethlehem' at Lowell, and published: 'Bible Exercises' (1854–84) and 'Old Forts Taken' (1878–85).

Miner, Thomas, American physician: b. Middletown, Conn., 15 Oct. 1777; d. Worcester, Mass., 23 April 1841. He was graduated at Yale College in 1796. The next six years were passed in teaching, and in the study of law, which in 1803 he abandoned for medicine, and in 1807 he commenced practice at Middletown. There prevailed about 1809 in the Connecticut Valley a malignant epidemic fever, for which Dr. Miner and his friend Dr. William Tully pursued a new mode of treatment, the former making careful notes of his cases, and numerous autopsies of those which proved fatal. In 1819 he was compelled by disease of the heart to withdraw from active life, and confined himself to a consulting practice and writing. In 1823 he published, in connection with Dr. Tully, 'Essays on Fevers and Other Subjects,' and in 1825 a treatise on 'Typhus Syncopalis.' Both works enjoyed a wide circulation.

Miner, William Harvey, American journalist and author: b. New Haven, Conn., 5 March 1877. He was graduated from Columbian University in 1899, was for a time on the staff of the Lowell (Mass.) *Mail,* and published: 'George Catlin: A Memoir' (1900); 'Daniel Boone' (1900); 'The Lewis and Clark Expedition' (1901); 'The Rowfant Club' (1903).

Min'eral Acids, Toxicology of. Ingestion of sulphuric acid causes pain in mouth, nose, throat, and epigastrium; bloody saliva; vomiting; bloody diarrhœa; feeble pulse; cold, damp surface; and collapse. Ulceration of stomach and larynx may occur and if the patient survives a form of Bright's disease follows quickly. The antidote is any available alkali, as soap, chalk, magnesia, or whitewash, scraped, perhaps, from a wall. Hydrochloric acid (q.v.) causes similar though possibly less severe symptoms, and recovery is more often possible. The antidotes are the same. Nitric acid (q.v.) exceeds sulphuric in the violence of the symptoms caused, with sudden death. Instead of black sloughs in the mouth, œsophagus, and stomach, such as occur in sulphuric-acid poisoning, in nitric-acid intoxication yellow sloughs and stains are found after death. Nitromuriatic-acid poisoning resembles poisoning by nitric acid in symptoms and pathological results. Similar yellow staining is found. The antidotes are alkalies. Phosphoric acid (q.v.) is not corrosive to animal tissues, though the glacial acid coagulates albumen. Its antidote is any alkali at hand, but it is probably not dangerous.

Mineral Colors, inorganic materials in the making of paint. They date as far back (or farther) in the history of coloring materials as organic materials, the paints used by primitive peoples for personal decoration being more commonly of this class. In Greek painting the main sources of coloring matters were: carbonate of chalk for whites; red and yellow ochres; and carbon. Apparently these same colors were used in Egyptian wall-painting. The range was much widened at the beginning of the Christian era at Rome, and the chemical activity of the last century has added largely to the mineral sources of colors. These may be roughly classified as follows: whites from calcium, for example, carbonate and sulphate; from barium, for example, sulphate (natural and artificial) and tungstate; from lead, for example, carbonate, hydrocarbonate, sulphate, antimonite, tungstate; from zinc, the oxide, oxychlorine, etc.; from silicum and talc; from antimony; and from the hyponitrate of bismuth. Reds are based on iron, as sesquioxide and red ochre; on mercury; on lead, as minium; on arsenic, as arseniate of cobalt; on antimony and on gold. The greatest source of yellows is chromic acid derivatives; next the lead colors; and then the ochres, and other minor sources. Blues are derived from copper (hydrate, arseniate, carbonate), from cobalt (aluminates and silicates), and from iron (phosphates, etc.); greens from chrome (notably sesquioxide), copper, manganese, etc.; and blacks mostly from carbons. An excellent hand-book of the subject is Perret, 'Couleurs Minérales' (1902).

Mineral Production of the United States. The mineral wealth of the United States has steadily increased in the value of the annual product so that it has for several years exceeded $1,500,000,000 a year. The figures for 1908 and 1909 are as follows:

MINERAL PRODUCTION OF THE UNITED STATES.
(First Products.)

PRODUCTS	1908		1909	
	Quantity	Value	Quantity	Value]
Arsenious oxide			2,428,000 pounds	$52,946
Asbestos	936 short tons	$19,624	3,085 short tons	62,603
Asphalt	161,011 short tons	1,911,060	233,379 short tons	1,933,527
Bituminous rock	37,371 short tons	146,821	55,376 short tons	205,756
Barytes	38,527 short tons	120,442	58,377 short tons	198,561
Bauxite	52,167 long tons	263,968	129,101 long tons	679,447
Bismuth (est.)			37 short tons	2,960
Borax (crude)	25,000 short tons	975,000	41,434 short tons	1,534,365
Bromine	1,055,636 pounds	102,344	728,875 pounds	92,735
Cement, natural	1,686,862 barrels	834,509	1,537,638 barrels	652,756
Cement, Portland	51,072,612 barrels	43,547,679	68,991,431 barrels	52,858,354
Chromic ore	359 long tons	7,230	598 long tons	8,300
Clay products		133,197,762		166,321,213
Coal, anthracite	74,347,102 long tons	158,178,849	72,374,249 long tons	149,415,847
Coal, bituminous	332,573,944 short tons	374,135,268	379,744,257 short tons	405,486,777
Cobalt oxide				273,645
Copper sulphate	38,240,211 pounds	1,800,000	30,980,729 pounds	1,600,000
Corundum and emery	669 short tons	8,745	1,580 short tons	18,185
Feldspar	70,474 short tons	428,553	76,539 short tons	401,788
Fluorspar	38,785 short tons	225,998	50,742 short tons	291,747
Fuller's earth	29,714 short tons	278,367	33,486 short tons	301,604
Garnet	1,996 short tons	64,620	7,792 short tons	102,315
Glass, sand	1,093,553 short tons	1,134,599	1,104,451 short tons	1,163,375
Graphite, crystalline	2,288,000 pounds	132,840	6,294,400 pounds	313,271
Graphite, amorphous	1,443 short tons	75,250	5,096 short tons	32,238
Gypsum	1,721,829 short tons	4,075,824	2,252,785 short tons	5,906,783
Iron ore	35,983,336 long tons	81,845,904	51,294,271 long tons	110,290,596
Lithium minerals	203 short tons	1,550		
Magnesite	6,587 short tons	19,761	9,465 short tons	37,860
Manganese	6,144 long tons	62,779	1,544 long tons	19,675
Manganiferous ores	55,620 long tons	132,556	68,654 long tons	215,925
Mica, scrap	2,417 short tons	33,904	4,090 short tons	46,047
Mica, sheet	972,964 pounds	234,021	1,809,582 pounds	234,482
Marls	8,469 short tons	4,330	21,814 short tons	45,053
Millstones		31,420		35,393
Monazite	422,646 pounds	50,718	541,931 pounds	65,032
Mineral paints	68,694 short tons	2,410,367	79,688 short tons	2,419,710
Mineral waters	55,868,820 gallons sold	6,712,680	64,674,486 gallons sold	6,894,134
Natural gas		54,640,374		63,206,941
Ochre	17,019 short tons	156,360	14,310 short tons	137,880
Oilstones		217,284		214,019
Petroleum	178,527,355 barrels	129,079,184	182,134,274 barrels	128,248,783
Phosphate rock	2,386,138 long tons	11,399,124	2,330,152 long tons	10,772,120
Peat		133,000		174,000
Pumice	10,569 short tons	39,287	15,103 short tons	33,439
Precious stones		415,063		534,380
Pyrite	222,598 long tons	857,113	247,070 long tons	1,028,157
Quartz	47,316 short tons	190,157	135,469 short tons	249,466
Salt	28,822,062 barrels	7,553,632	30,107,646 barrels	8,343,831
Sand	36,122,491 short tons	12,135,433	58,461,100 short tons	17,173,615
Sand-lime brick		1,029,699		1,150,580
Slate		6,316,817		5,441,418
Slate, roofing	1,333,171 squares	5,186,167	1,133,713 squares	4,394,597
Slate, mill stock		1,130,650		1,046,821
Soapstone and common talc	46,615 short tons	703,832	135,469 short tons	249,466
Soda, natural				200,000
Stone, building		16,040,630		20,262,012
Stone crushed		20,262,012		24,078,780
Sandstone		7,594,091		8,010,454
Stone, limestone		27,682,002		32,070,401
Sulphur	369,444 long tons	6,668,215	239,312 long tons	4,432,066
Talc, common; see soapstone.				
Talc, fibrous	70,739 short tons	697,390	48,536 short tons	359,957
Tripoli and infusiol earth		97,442		122,348
Thorium minerals	422,646 pounds	50,718	543,931 pounds	65,282
Titanium ores				10,000
Tungsten ores	671 short tons	229,955	1,619 short tons	614,370
Zinc ore, exported	26,108 short tons	877,745	12,455 short tons	412,300
Zinc, oxide	56,292 short tons	5,072,460	68,974 short tons	6,156,755
Zinc, white (est)				4,000,000
Estimated miscellaneous		8,000,000		20,000,000

PRODUCTION OF METALS IN THE UNITED STATES.

(First Products.)

PRODUCTS	1908		1909	
	Quantity	Value	Quantity	Value
Aluminum	11,152,000 pounds.	$2,434,600	34,200,000 pounds	$6,575,000
Antimonial lead	13.620 short tons	1,264,771	12,896 short tons	1,231,019
Copper	942,570,721 pounds	124,419,335	1,092,951,624 pounds	142,083,711
Ferromanganese	152,018 long tons	6,080,720	225,040 long tons	10,351,840
Ferromolybdenum	No statistics		No statistics	
Ferrotungsten	No statistics		No statistics	
Gold	4,574,340 Troy oz.	94,560,000	4,821,701 Troy oz.	99,673,400
Iron, pig	15,936,018 long tons	254,321,000	25,795,471 long tons	419,175,000
Indiana	No statistics		No statistics	
Lead	310,762 short tons	26,104,008	354,188 short tons	30,460,168
Molybdenum	No statistics		No statistics	
Nickel	No statistics		No statistics	
Platinum	750 Troy oz.	14,250	638 Troy oz.	15,590
Quicksilver	19,752 flasks	824,146	21,075 flasks	888,710
Silver	52,440,800 Troy oz.	28,050,600	54,721,500 Troy oz.	28,455,200
Tin	....	....	....	4,832
Zinc	190,749 short tons	17,930,406	230,225 short tons	24,864,300

SECONDARY MINERAL PRODUCTS OF THE UNITED STATES.

PRODUCTS	1908		1909	
	Quantity	Value	Quantity	Value
Alum	7,700 short tons	$236,710	....	....
Alundum	3,160,000 pounds	189,600	13,578,000 pounds	$814,860
Ammonium sulphate	87,600 short tons	5,247,240	106,500 short tons	5,968,260
Arsenic	2,603,505 pounds	99,193	2,015,880 pounds	57,957
Bromine	1,149,000 pounds	103,410	1,110,000 pounds	110,000
Carborundum	4,907,170 pounds	294,430	6,478,290 pounds	388,697
Cement, slag	4,535,300 bbls.	3,628,240	....	....
Coke	23,496,666 short tons	55,595,792	35,076,902 short tons	81,638,058
Copper sulphate	37,654,961 pounds	1,833,796	45,000,000 pounds	1,900,360
Copperas	35,334 short tons	388,674	42,225 short tons	464,475
Crushed steel	630,000 pounds	44,100	818,000 pounds	57,260
Graphite, artificial	7,385,511 pounds	502,667	6,870,529 pounds	467,196
Lead, white	116,628 short tons	10,515,315	131,643 short tons	12,652,638
Lead, sublimated white	9,100 short tons	973,000	....	....
Lead, red	11,358 short tons	1,156,282	15,805 short tons	1,438,197
Lead, orange mineral	393 short tons	43,157	530 short tons	68,000
Litharge	12,254 short tons	1,231,206	13,391 short tons	1,266,903
Manganese residuum	110,225 long tons	220,450	....	....
Mineral wool	9,197 short tons	77,228	11,626 short tons	101,621

Mineral Tallow (Hatchettin, Hatchettite, or Adipocere Mineral), a fatty mineral, 86 per cent carbon, and 14 per cent hydrogen, discovered by Charles Hatchett, English chemist, in the clay ironstone of Merthyr Tydvil. It looks like wax, is greenish yellow in color, and has a pitchy or bituminous smell when heated.

Mineral Waters, a commercial and medicinal name applied to all spring waters which possess qualities in relation to the animal body different from ordinary water. Mineral waters have been used as remedial agents from the earliest days of Greece and Rome. There were sulphurous thermal springs at Tiberius, which are still used by invalids from all parts of Syria, in cases of tumor, rheumatism, gout and other diseases. There are also warm springs at Calirrhoe, near the Red Sea, which are mentioned by Josephus as having been tried by Herod in his sickness. The Romans discovered the thermal springs in Italy, and the springs in other parts of Europe; Baden-Baden, Aix-la-Chapelle, the Spa in Belgium, and others. Pliny mentions mineral springs in various parts of Europe.

Classification.— No classification of mineral waters based upon their chemical composition can be strictly exact, because many springs are intermediate between well characterized groups. The following classification is regarded as the most convenient: (1) Alkaline waters; (2) Bitter waters; (3) Muriated waters; (4) Earthy waters; (5) Indifferent thermal waters; (6) Chalybeates; (7) Sulphurous waters. The therapeutic action of mineral waters depends chiefly upon their chemical composition and their temperature, though other circumstances, as situation, elevation, climate, geological formation and mean temperature have an important bearing upon the success of the treatment.

Temperature.— The best time for undergoing a course of mineral waters is, in the majority of cases, the months of June, July, August and September. There are, however, exceptions depending upon climate. Early rising is usually advisable during a course of mineral waters, and, as a general rule, the water should be drunk before breakfast, at intervals of about a quarter of an hour between each tumbler, moderate exercise being taken in the intervals. In many cases bathing is of even greater importance as a remedial agent than drinking. Baths are generally between breakfast and dinner, and should never be taken soon after a full meal. The time during which the patient should remain in the bath varies very much at different springs, and the directions of the local physician should be strictly attended to on this point. As a general rule, the treatment should not be protracted beyond the space of six weeks or two months, but on this point the patient must be solely guided by the physician resident at the springs. Indulgence in the pleasures of the table, and excesses of any kind, frequently counteract the salutary effects of the waters, while perfect mental relaxation is an important auxiliary to the treatment. As regards temperature, if the waters are between 70° and 98° they are called tepid, while all exceeding the latter are classified as hot springs. The following examples give the degrees of temperature found in different thermal springs: Sweet Springs, W. Va., 74°; Warm Springs, French River, Tenn., 95°; Washita, Ark., 140° to 156°; San Bernardino Hot Springs, Cal., 108° to 172°; Las Vegas, N. Mex., 110° to 140°; Sulphur Springs, Aix-les-Bains, France, 108°; Kaiserquelle, Aix-la-Chapelle, Prussia, 131°; Carlsbad, Bohemia, 162°.

American Springs.— In the United States the Rock Spring was known at Saratoga, N. Y., among the Indians as early as 1767, and over 40 springs have since been discovered there. In 1830, springs were well and popularly known in West Virginia, and of these the Bath mineral spring, now known as the Berkeley Spring, was visited as early as 1777, while the White Sulphur Springs were used by the Indians in 1778. In these American springs, like those in Europe, the geologists agree that dissolved mineral substances are obtained from the rocks through which the water has flowed. The majority of waters contain carbonic acid which greatly increases their solvent powers in the presence of lime, magnesia and iron. If the waters are alkaline they may take up substances which are ordinarily rather insoluble, such as silica. There is, undoubtedly, more or less relation between hot springs and the geological structure of a region.

Alkaline Waters.— Simple alkaline acidulous waters are composed of carbonic acid and bicarbonate of soda. The most important springs of this class are the thermal springs of Las Vegas, N. Mex., and the cold springs at Sharon, N. Y. These waters are useful in certain forms of indigestion, jaundice, gallstones, gravel, gout, and chronic catarrh of the respiratory organs. Muriated alkaline acidulous waters, which differ from the preceding, containing a considerable quantity of chloride of sodium. The most important springs of this kind are the thermal springs of Ems, and the cold springs of Selters and Salzbrunn. They are useful in chronic catarrhal affections of the bronchial tubes, the stomach and intestines. Alkaline saline waters contain sulphate and bicarbonate of soda, such as the warm springs of Carlsbad, serviceable to patients suffering from abdominal plethora, if unconnected with diseases of the heart or lungs. These waters afford an excellent remedy for habitual constipation.

Bitter Waters.— The chief contents of these waters are the sulphates of magnesia and soda. The best known springs of this class are those of Sedlitz and Kissingen; English examples are in the bitter waters of Cherry Rock, in Gloucestershire, and the Purton Spa, in Wiltshire, and in America the springs at Mt. Clemens, Mich. These waters act as purgatives and diuretics.

Muriated Waters.— Simple muriated waters contain a moderate quantity of chloride of sodium or common salt. The chief springs of this class are Wiesbaden and Baden-Baden, which are hot; and those of Kissingen, Homburg, and Cheltenham, which are cold. The muriated saline springs of Saratoga, in the United States, are some of them chalybeate, others sulphurous or iodinous; all of them being rich in carbonic acid gas. The Ballston saline springs near Saratoga have a very high proportion of carbonic acid. They are chiefly employed in cases of gout, rheumatism and scrofula. Muriated lithia waters contain chlorides of sodium and lithium. In gout they first aggravate the pain, but then give relief; and in periodic headache they have been found serviceable.

Earthy Waters.— These contain sulphate and carbonate of lime. The Wildungen water is a diuretic, and not only promotes the elimination of gravel, but by its tonic action on the mucous membrane of the urinary passages, serves to prevent the formation of fresh concretions. It is also much used for chronic catarrh of the bladder. The baths of Leuk, in which many patients remain nine hours daily, until an eruption appears, are chiefly used in chronic skin diseases.

Indifferent Thermal Waters contain a small amount of saline constituents. Of the springs of this class the most important are Hot Springs, Ark., and Roanoke, Va. Their most striking effects are to stimulate the skin and excite the nervous system. They are especially used in chronic rheumatism and chronic gout and in diseases of the skin.

Chalybeate Waters— Simple acidulous chalybeates contain carbonic acid and bicarbonate of protoxide of iron. Saline acidulous chalybeates, contain sulphate of soda and bicarbonate of protoxide of iron. The quantity of iron present is very small — from .08 to .15 in 1,000 parts. Many of the chalybeate springs, especially in Germany, contain also much carbonic acid; carbonate, sulphate, and chloride of sodium are frequently present, and may help in the cure. The Putnam Spring at Saratoga and the springs of Maine and Massachusetts are examples of chalybeate wells which are very seldom thermal. Maine has both chalybeate and sulphurous springs. Chalybeate waters are valuable in anæmia.

Sulphurous Waters.— These waters contain sulphuretted hydrogen or metallic sulphides (sulphurets), or both. The most important sulphurous thermals are those of Aix-la-Chapelle, Baden, Barèges, and Bagnères de Luchon, in Europe. There are hundreds of these sulphurous springs in the United States, including those at Mt. Clemens, Mich., Bath, Va., and Warm Springs, Va. They are extensively used in chronic diseases of the skin, and are of service in many cases in which exudations require to be absorbed, as in swellings of the joints, in old gun-shot wounds, and in chronic gout and rheumatism. The sulphurous waters are employed externally and internally, and mineral mud-baths are believed by many physicians to form a valuable auxiliary.

Production.— The commercial output of mineral waters in the United States in 1909 amounted to 64,674,486 gallons, valued at $6,894,134. The imports in the same year amounted to 3,464,524 gallons, valued at $1,085,177. These figures are based on 760 springs as against 695 springs in 1908. Minnesota, New York, Wisconsin, Massachusetts, Michigan, Ohio, and California are the largest producing States in the order given. A number of foreign mineral waters are imported in the United States and find a large sale. Chief among these is the Apollinaris water which comes from Ahrweiler, Germany. The majority of the commercial springs of the United States are found east of the Mississippi. In the South, Kentucky, Tennessee, and Arkansas are the chief producers of mineral waters. The Hot Springs of Arkansas are among the most important thermal springs in the entire country. The Texas springs are peculiar from the fact that many of them show free sulphuric acid. In Wisconsin the springs of Waukesha are widely known. In New Mexico, the Las Vegas Hot Springs are often visited. There are no hot springs in the New England States.

Bibliography.—Althans, 'Spas of Europe' (1862); Glover, 'Mineral Waters' (1857); Tichbourne, 'Mineral Waters of Europe' (1883); Walton, 'The Mineral Waters of the United States and Canada' (1890).

Mineral Wool, a product of molten slag, or rock under air or steam-jet, also called slag wool, rock wool, silicate cotton, cotton fibre. The result of this process is a thin vitreous fibre, useful as a non-conductor. It was first manufactured in Germany in the early 70's. In 1875 a little was made at the Greenwood iron furnace, Orange County, N. Y.; the industry was firmly established by 1885; then because of the entry into the field of rock wool, that is, a fibre made directly from the rocks and not from slag, the slag wool industry fell off. In 1909 11,626 tons of mineral wool, valued at $101,621, was the product of the United States, a gain of more than 35 per cent over the preceding year when the product weighed 9,197 tons and was valued at $77,228. These figures included rock and slag wools; the former command a price 50 per cent higher than the latter. The slag wools have a small percentage of sulphur, unless especially desulphurized after the slag has been re-melted, and thus sulphuric acid may be formed if water gets access to the wool and acts on the calcium sulphide in it. The sulphuric acid thus formed is injurious to the pipes. Hence rock wool is substituted for slag wool, or the slag wool is carefully desulphurized. Mineral wool of either sort, if of good grade, is one of the best practical non-inflammable coatings; as a lining for floors it has the double advantage of being sound-proof and non-conducting.

Mineralogy, the science which treats of minerals, or those inorganic portions of the earth's crust and the celestial bodies, either solid or liquid, which are homogeneous and whose composition may, therefore, be expressed by a definite chemical formula.

Scope and Utility of Mineralogy.—The researches of the mineralogist unfold to him all of the beauties of inorganic nature; he climbs the loftiest mountain peaks to gather there the pellucid rock crystals which the ancients believed were permanently solidified ice; he descends with the miner into the depths of the earth to bring forth her precious metals; he visits the dark caverns and from beneath the slowly dropping mineral-laden waters he chisels the delicately veined and clouded Mexican onyx; in the "blue ground" in the interior of the dark continent he uncovers the sparkling diamond, while on the shores of Brazil he finds the wonderful monazite sands which the chemist has transformed into light. The mineralogist impartially records the composition and all of the properties of every mineral and thus makes available for the chemist, the inventor and the manufacturer a host of suggestive facts. It is not surprising, therefore, that new uses for minerals are constantly being discovered, indeed few are the arts to which mineralogy does not make some important contribution. The student of mineralogy is instantly charmed with the external beauties of form and color in crystallized minerals. He is soon brought to consider the still more interesting phenomena and problems connected with their internal structure. Many of the physical properties of minerals are exceedingly interesting, while chemical mineralogy opens up a wide and most attractive field for research.

History.— The mention of the precious stones in the breast-plate of the Hebrew high priest (Ex. xxviii. 17) shows that the beauties of the mineral kingdom were appreciated as long ago as 1491 B.C. There is still extant part of a work, 'On Stones,' written by Theophrastus, who died 286 B.C., while Pliny in his great work on natural history, published 77 A.D., devotes much attention to ores, metals, stones and gems. The birth of mineralogy as a science took place in the publication by Wallerius in 1747 of his systematic work on mineralogy. Steady progress has since been made, and it would be a long list indeed which would enumerate the names of even the prominent investigators each of whom has made important contributions to the science. J. D. Dana, in the various editions of his great 'System of Mineralogy,' succeeded in reviewing, revising and systematizing the work of others and adding to it the results of much original research, until now, under the no less capable authorship of his son, E. S. Dana, this work is the accepted standard all over the world. Much valuable work has recently been done, chiefly by German investigators, in physical mineralogy, especially in connection with the optical properties of minerals. The present great activity in mining and the growing appreciation of gems and decorative stones, stimulates and often rewards the search for new and interesting minerals. The introduction of the study of elementary mineralogy into many public and private schools is evidence that educators are beginning to appreciate the mental training which it brings, as well as the far-reaching importance of the mineral industry which now enters so largely into every-day life.

Mineralogy is usually considered under the following divisions: (1) Crystallography. (2) Physical Mineralogy. (3) Chemical Mineralogy. (4) Descriptive Mineralogy.

Crystallography.— Most minerals in the process of solidifying from the liquid or gaseous state, or from solutions, assume certain characteristic forms, with definite molecular structure. These are called crystals. It is the present theory that a crystal is the result of an attraction between its molecules exerted in certain fixed directions. (See MOLECULAR THEORY.) As long ago as 1669 the Danish geologist, Nicolaus Steno, proved that while the faces of quartz crystals may vary greatly in their relative sizes, the angles between like faces are constant. In 1704 Dominico Gulielmini advanced the theory that the interfacial angles were constant in all salts and that each had its own form. Near the close of the 18th century Romé de l'Isle first formulated the present law of the constancy of interfacial angles. After examination and measurement with a contact goniometer of a very large number of crystallized minerals and salts, he announced that each could be referred to its own characteristic primitive form, that all crystals of the same substance either had the constant angles of the primitive form or were bounded by secondary faces bearing fixed relations to the primitive form. Abbé Haüy, about 1784, discovered that even the most complex crystal forms could be reproduced by the addition to the primitive form of successive layers of minute primitive forms, each layer containing a uniformly smaller number of rows than its predecessor. From these observations he concluded that crystals were formed of minute particles each having the primitive form and all symmetrically arranged. Whether his hypothesis of the shape of the molecules be true or not, all crystallographers are agreed that a definite molecular structure is essential to the existence of a crystal. The molecules are assumed to be almost infinitely minute, for the surfaces of crystals, even when viewed with the highest powers of the microscope, appear perfectly smooth. It seems certain also that the molecules are not in contact with one another, but are separated by distances probably as great or even greater than their diameter, for only thus could heat and light waves be transmitted through them. The particular form which a crystal assumes is determined by the manner in which the molecules group themselves in response to the intermolecular forces. These forces vary greatly in intensity and direction and thus produce the different types of crystals. Examination of a large number of crystals shows that most of them exhibit distinct symmetry. As the symmetry of faces is but the external manifestation of the internal molecular structure, variations in the size of the faces and in their distances from the plane of symmetry do not destroy their symmetry, because their interfacial angles are not changed. Cuprite, for example, occurs in cubes and also in needle-like crystals which careful examination shows are simply cubes enormously elongated in one of the axial directions. As it can be proved by physical tests that the molecular structure is identical in each of these forms of cuprite, the crystallographer does not consider that distortion destroys symmetry. In studying the relations of the faces of crystals the existence is assumed of certain fixed lines of reference called axes. The crystal faces intersect these axes and by measuring the interfacial angles the proportionate lengths of the axes can be calculated. These lengths are known as the axial ratio. The law of rational intercepts, which is one of the foundation stones of crystallography, asserts that any face of a crystal, extended if necessary, will cut the axes at distances which can be expressed by simple multiples or fractions of the axial ratio. For example, the primitive rhombohedron of calcite, *r* (see Figs. 1, 2, and 3), cuts the vertical axis at the unit distance; the rhombohedron *e* at half the unit distance, while the rhombohedron *f* cuts it at twice the unit distance. Prof. W. H. Miller of Cambridge University in 1839 expanded Whewell's application of spherical trigonometry to crystallography and deduced a method of designating the relative positions of the faces by certain simple indices. Miller's system of notation is very extensively used and is gradually supplanting other more complex systems.

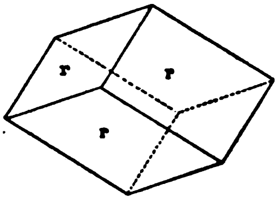


FIG. 1.

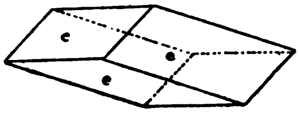


FIG. 2.

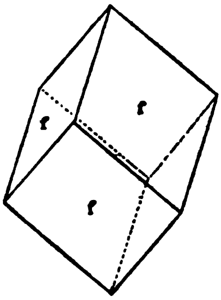


FIG. 3.

Though the variety of crystal forms is almost endless, they are all embraced in one of the six systems of crystallization whose relations are as follows:

(A) CRYSTALS HAVING 3 AXES.

I. AXES AT RIGHT ANGLES.

1. *Isometric System.* Axes all of same length.
2. *Tetragonal System.* Two axes equal, third longer or shorter.
3. *Orthorhombic System.* Axes all of different lengths.

II. ONE AXIS OBLIQUE TO OTHER TWO.

4. *Monoclinic System.* Axes all of different lengths.

III. ALL AXES OBLIQUE TO EACH OTHER.

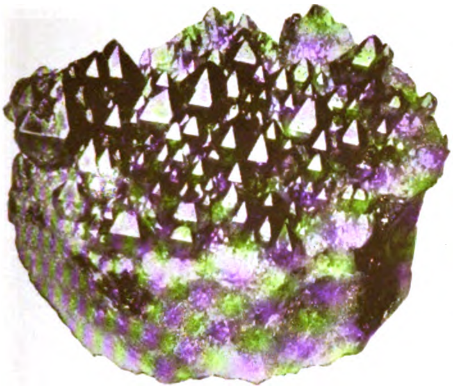
5. *Triclinic System.* Axes all of different lengths.

(B) CRYSTALS HAVING 4 AXES.

6. *Hexagonal System.* Three axes of equal length and intersecting each other at equal angles; fourth axis at right angles to other three.

A twin crystal is one in which one of the halves of a single crystal, or one of two whole

MINERALOGY.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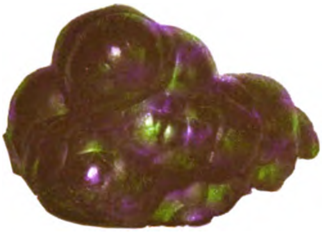
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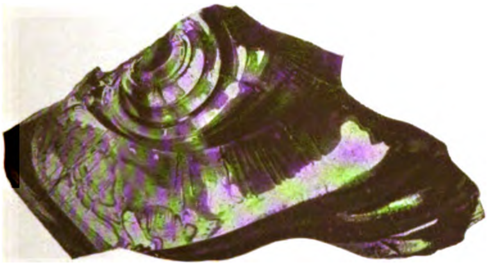
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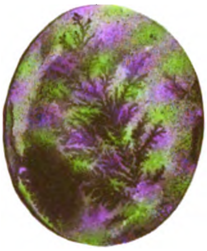
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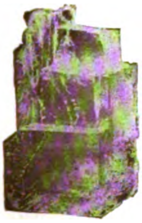
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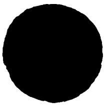
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9. Amethyst Crystals in parallel position.
10. Reniform Hematite.
11. Conchoidal Fracture of Uintahite.
12. Tree Agate showing arborescent form of Wad
13. Cubical cleavage of Halite.
14. Curved Gypsum.
15. Star Sapphire.
16. Reticulated Cerussite.

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crystals, appears in a position exactly reversed in reference to the other half or the other crystal, as though it had been revolved exactly 180° usually on or parallel to one of the simple faces of the crystal, called the twinning plane. Contact twins generally appear like the reversed halves of a single crystal, as seen in figures 4 and 5. This form, known as the spinel twin, is common with spinel and diamond and is occasionally seen in magnetite. Penetration twins result from the union of two complete crystals by the revolution of one on the twinning axis through 180°. One of the commonest illustrations is the Carlsbad twin of orthoclase, figure 6. Eleven distinct types of twinning are known in orthoclase. Among the triclinic feldspars polysynthetic twinning is very common. This is a repeated twinning, usually of lamellæ so thin as to manifest their presence only by fine striations.

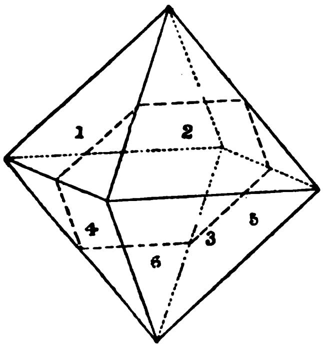

Fig. 4.

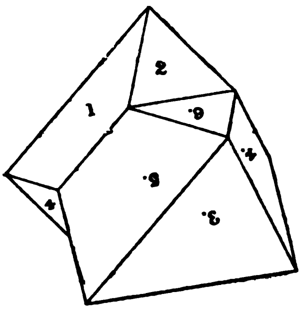

Fig. 5.

While crystals usually occur isolated or in irregular clusters, they are frequently found grouped in parallel position, as shown in figure 9 of amethyst from Montana.

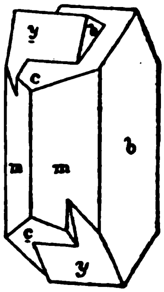

Fig. 6.

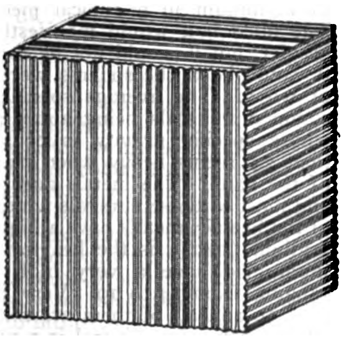

Fig. 7.

The surfaces of crystals are sometimes covered with parallel lines called striations. These lines are really alternate furrows and ridges and are symmetrically arranged in reference to the edges of the crystals. They are due to a conflict between the crystallizing forces which results alternately in one face and then another. The result is this "oscillatory combination" of small faces. Pyrite cubes (figure 7), also quartz, calcite, tourmaline and many other species, often show these striations. Curvature of the crystal faces often results from this oscillatory combination, as in many calcites from Joplin, Mo., but curvature is also produced by pressure, as in twisted stibnite and quartz crystals, or from certain intermolecular forces, such as those which produce the beautiful arborescent frost crystals often seen on windows or stone walks, as well as the nearly spherical diamonds of Brazil and South Africa and the peculiar forms of gypsum found in the Mammoth Cave, figure 14. Liquid and gaseous inclusions often manifest their presence by moving bubbles. Enclosures of other minerals, such as needles of rutile and tourmaline, are very varied.

Usually the conditions coincident with the formation or deposition of minerals have been such that only confused crystalline masses have been produced. Such aggregates are shown by the structure of the mineral and include (1) Columnar and fibrous, respectively denoting coarse or fine fibres, examples of which are furnished by some tremolite and by cyanite (bladed-columnar) and asbestos. Stellated (e. g., wavellite) and radiated (e. g., pectolite) are varieties of fibrous aggregates. (2) Lamellar, in plates, e. g., selenite. Under this are included concentric, the plates circling crudely around a common centre, e. g., malachite and some banded agate. Foliated, the plates thin and separable, e. g., foliated talc. Micaceous is the most perfectly developed type of a foliated structure. (3) Granular, including coarse-granular, e. g., Tuckahoe dolomitic marble; fine-granular, e. g., Carrara statuary marble; impalpable, e. g., lithographic limestone.

Linking crystallized with amorphous minerals are the many interesting imitative forms, a few of which are: reniform, kidney-shaped, e. g., hematite variety kidney ore, figure 10; botryoidal resembling a cluster of grapes, common in limonite, chalcedony, psilomelane; globular or spherical, e. g., pectolite, hyalite; nodular, e. g., flint; oolitic, in masses of small concretions resembling a fish's roe, e. g., oolite; dendritic and arborescent, in tree-like forms, e. g., wad, figure 12; reticulated, net-like, usually due to twinning, e. g., cerussite, figure 16; coralloidal, resembling coral, e. g., aragonite variety flos-ferri.

When one mineral exhibits the characteristic form of another it is known as a pseudomorph after the original mineral; thus quartz (a rhombohedral mineral) appearing in cubes which were originally fluorite is called quartz pseudomorph after fluorite. Pseudomorphs are formed, 1. By a change in chemical composition, e. g., limonite (hydrated iron sesquioxide) pseudomorph after pyrite (iron disulphide). 2. By substitution, e. g., cassiterite after orthoclase, also silicified wood, in which the original wood has been replaced by silica. 3. By incrustation, as in the coating of various objects by the hot springs in the Yellowstone Park.

Physical Mineralogy.— The external form of crystals has been shown to be due to the existence of a definite, internal, molecular structure. Physical mineralogy aims to explain the phenomena observed in connection with this structure.

1. *Characters Due to Cohesion and Elasticity.* — Cohesion is the force which holds the molecules of a homogeneous substance together. Elasticity is the force which tends to bring the molecules when separated back to their original position. These forces manifest themselves in the properties of cleavage, fracture, tenacity, hardness, etc.

(a) Cleavage is the tendency of certain crystallized minerals to break in definite directions, invariably parallel to one or more of the simpler faces of the crystal. In the isometric system cubic cleavage is well illustrated by halite, figure 13; octahedral cleavage by fluorite and diamond; dodecahedral, by sphalerite. In the tetragonal system basal cleavage is shown by apophyllite, prismatic by rutile and wernerite. In the orthorhombic system, topaz has marked basal cleavage, while barite cleaves readily parallel to the prism. In the monoclinic system clinopinacoidal cleavage is exhibited by orthoclase and selenite, basal by the micas and orthoclase, prismatic by amphibole. Pinacoidal cleavage in the triclinic system is prominent in anorthite, albite and rhodonite. In the hexagonal system basal cleavage is shown by beryl, prismatic by nephelite, rhombohedral by calcite and dolomite. Cleavage is one of the most important aids to the mineralogist in the determination of unknown minerals by physical tests and it often enables him to recognize at a glance the crystal system of the mineral. Parting is separation along secondary twinning planes and much resembes cleavage. Pyroxene is a good illustration, figure 8.

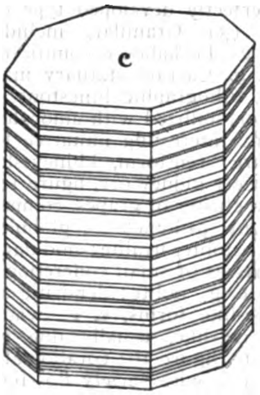

Fig. 8.

(b) Fracture is the break of minerals other than cleavage and parting. It is most noticeable when it is conchoidal or shell-like. This fracture which is quite common among minerals is illustrated by figure 11 of uintahite. A hackly or jagged fracture is shown by copper and other native metals. Wollastonite often well illustrates a splintery fracture.

(c) The hardness of a mineral is its resistance to abrasion, or the resistance which its molecules offer to a body trying to push them into a new position. It is usually, though very crudely, determined by comparison with the following Scale of Hardness introduced by Mohs: (1) Talc; (2) Selenite; (3) Calcite; (4) Fluorite; (5) Apatite; (6) Orthoclase; (7) Quartz; (8) Topaz; (9) Corundum; (10) Diamond. While Mohs' scale is universally used in all mineralogical works, various methods have been adopted to determine the absolute hardness (see SCLEROMETER). Hardness is often one of the most conclusive tests in identifying minerals by their physical properties.

(d) The tenacity of a mineral is the resistance which its molecules offer to an effort to completely separate them. When this resistance is but slight the mineral is termed brittle; if it is stronger so that shavings may be cut off with a knife, but the shavings can be powdered by a hammer, it is called sectile, e. g., talc. Malleable minerals exhibit still greater tenacity, as shavings are not powdered by the blow of a hammer. The native metals, copper, gold and silver, are malleable and also ductile, that is, capable of being drawn out into wire. Flexible minerals are those which can be bent, but in which the force of cohesion is not strong enough to cause the molecules to return to their original position, e. g., foliated talc.

(e) Elasticity in minerals not only involves resistance of their molecules to complete separation, but indicates such a development of cohesion as to prevent a permanent bending of the specimen and lead to its return to its original position when the disturbing force is removed. The micas exhibit this property to a marked degree.

2. *The Specific Gravity* of a mineral is the ratio of its weight to the weight of an equal volume of water. It is dependent upon the weight of its molecules and the closeness of their aggregation. Corundum, a compound of the exceedingly light metal aluminum with the gas oxygen, nevertheless is comparatively heavy, having a specific gravity of 4. As a single molecule of Al_2O_3 must be relatively light, it follows that corundum is heavy because its molecules are closely aggregated. This will become clear by comparing a cubical box with a single wooden sphere at each corner, to the same box filled with such spheres and imagining that these spheres represent the closely crowded molecules of aluminum in a cubical piece of corundum. The filled box would manifestly be very much heavier, but it would not be nearly so heavy as it would be if the spheres were of lead instead of wood. The average specific gravity among common minerals being about 2.7, any mineral whose specific gravity is considerably greater than 2.7 seems heavy when placed in the palm of the hand. The metals and metallic minerals and most of those minerals which are compounds of the heavier metals have a high specific gravity. Iridium (22.75) is the heaviest; gold and platinum also have a very high specific gravity, ranging from 14 to 19. Very few minerals exceed 10 and all of them are metallic. The specific gravity of a mineral is a property of greatest importance because it is subject to such slight variations unless the material is impure or contains cavities.

3. *Characters Depending Upon Light.*— The optical characters which are common to both crystallized and amorphous minerals include chiefly diaphaneity, color, lustre, asterism, fluorescence and phosphorescence.

Diaphaneity or transparency is the quantity of light which a mineral transmits. If a mineral offers but little if any resistance to the passage of light, that is to say, when all the details of an object can be readily seen through it, it is described as transparent, e. g., rock crystal. If, on the other hand, a mineral permits no light to traverse it, and it is, therefore, impossible to see any object through it, it is called opaque, e. g., jasper. Between transparent and opaque minerals are those which are translucent, e. g., chalcedony, in which light is transmitted, but objects cannot be seen. Very many substances ordinarily perfectly opaque appear translucent or even transparent in very thin sections, e. g., gold.

The color of a mineral is the kind of light which it either transmits or reflects. If transparent a mineral may transmit one kind of light and reflect another; hematite, for example, ordinarily appears black by reflected light, but on looking through thin crystals they appear red. Some minerals transmit different colors in different directions (see DICHROIC CRYSTALS). The external or superficial colors are those which first appeal to the eye, but they are not usually of great importance because not constant. The essential color or streak of a mineral, which is the color of the mineral when powdered, is a character of first importance because it varies but little regardless of what the external color may be. Play of colors, change of colors, iridescence, tarnish and opalescence are properties whose study is full of interest.

The lustre of a mineral is the manner in which it reflects light. According to its intensity it is said to be splendent, shining, glistening, glimmering, or, if devoid of lustre, dull. In describing its quality minerals are separated into metallic, sub-metallic and unmetallic. Metallic minerals, of which galena is a good illustration, are not considered to possess a metallic lustre unless they are opaque. The unmetallic minerals are further divided into adamantine, the lustre of the diamond; vitreous, glassy, e. g., rock crystal; resinous or waxy, e. g., sulphur, amber; greasy, e. g., elaeolite; pearly, e. g., brucite; metallic-pearly, e. g., bronzite; silky or satiny, e. g., chrysotile, satin spar. Lustre is a quality of considerable importance, the first step in the determination of minerals being to decide whether or not they possess a metallic lustre.

Asterism is the property of showing a six-rayed star either by reflected or transmitted light. Star-mica and star sapphire, figure 15, are the best illustrations.

Fluorescence is the property of emitting from within light of one color during exposure to light of other colors, or to the emanations from radium. Fluorite has long been cited as the most prominent illustration of the property, but recent investigations with ultra-violet rays have shown that willemite from Franklin Furnace, New Jersey, is more magnificently fluorescent when exposed to ultra-violet rays than any other known mineral. Some calcite from Franklin Furnace and from Longban, Sweden, shows a charming rose pink fluorescence under the ultra-violet rays. This property seems to be due to a transformation of the rays within the mineral and their emission as light of greater wave length. See FLUORESCENCE.

Phosphorescence is the property of emitting light for a time after gentle heating or after exposure to radium, an electrical discharge or to light. The ultra-violet rays are especially powerful in exciting phosphorescence. Fluorite exhibits both fluorescence and phosphorescence, but many fluorescent minerals do not phosphoresce. Some New Jersey willemite is magnificently phosphorescent after exposure to the ultra-violet rays. Kunzite glows with a rich red light after excitation by the ultra-violet or the Roentgen rays. Many other minerals, including diamond, wollastonite, pectolite and all the minerals from Borax Lake, Cal., exhibit phosphorescence. Phosphorescence is explained by the transformation into light of the energy communicated to the body by some exciting agent. (See PHOSPHORESCENCE.)

In the more advanced study of mineralogy very great importance is attached to the consideration of the optical characters of crystals. The crystal system and even the identity of the mineral species may often be determined by an examination of its optical characters. Isometric crystals have like optical properties in all directions and are, therefore, called isotropic. The optical properties of all other crystals are unlike in different directions and they are consequently called anisotropic. Anisotropic crystals are subdivided into two groups, isodiametric, including crystals of the tetragonal and hexagonal systems, and anisometric, including crystals of the orthorhombic, monoclinic and triclinic systems. In isodiametric crystals there is no double refraction in the direction of the vertical crystallographic axis, which is called the optic axis; these crystals are consequently said to be uniaxial. The optical structure of uniaxial crystals is represented by a spheroid, a section of which normal to the optic axis is always a circle. Anisometric crystals are more complex, but there are always two directions analogous in character to the single axis of the uniaxial group, so that anisometric crystals are said to be biaxial. Their optical structure is represented by an ellipsoid with three unequal rectangular axes. There are two directions in which such ellipsoids can be cut so as to yield cross sections which are circles. The optic axes are normal to these planes. In orthorhombic crystals the axes of the ellipsoid coincide in direction with the crystallographic axes. In monoclinic crystals one of the ellipsoidal axes coincides with the axis of crystallographic symmetry, while the other two lie in the plane of symmetry. In triclinic crystals there is no essential relation between the ellipsoidal and the crystallographic axes. When examined in polarized light isometric crystals exhibit no special phenomena. (See PHYSICAL CRYSTALLOGRAPHY.)

4. *Characters Depending upon Heat.*— Fusibility is the relative ease with which a mineral melts. Mercury, water and petroleum are the only minerals which are liquid at ordinary temperatures of the atmosphere. Von Kobell's scale of fusibility is 1. Stibnite, fusible in a candle flame, even in large pieces. 2. Natrolite, fusible in a candle flame, but only when in small splinters. 3. Almandite Garnet, easily fusible in the blowpipe flame, even in large pieces. 4. Actinolite, fusible with difficulty in the blowpipe flame in large pieces. 5. Orthoclase, fusible with difficulty in the blowpipe flame, even when in small splinters. 6. Bronzite, scarcely fusible at all. The determination of the fusibility of a mineral is frequently of aid in its identification.

Other minor characters depending upon heat are conductivity, expansion, specific heat and diathermancy.

5. *Electricity and Magnetism.*— Electricity is developed in all minerals by friction, though in greatly varying degrees. If both positive and negative electricity are developed in a crystal by a change in temperature it is said to be pyro-electric, e. g., if tourmaline be heated it becomes differently electrified at opposite terminations. Electricity developed in a crystal by pressure is termed piezo-electricity.

Magnetism manifests itself among minerals in two ways: (1) A few minerals are attracted by a magnet. This attraction is very much stronger in the case of magnetite than any other mineral, but pyrrhotite and platinum are also slightly magnetic. (2) These same minerals are sometimes natural magnets, exhibiting polarity and attracting iron or magnetite. Lodestone is a variety of magnetite which possesses this property to a very marked degree. The attraction of the electro-magnet for minerals containing iron has a very important commercial application in concentration of low grade iron ores.

6. *Taste, Odor and Feel.*— Taste is a property present only in minerals which are soluble. Salt is the commonest mineral having a decided taste, known as saline. Among rarer minerals, epsomite is said to be bitter, nitre is cooling, chalcanthite is metallic, melanterite is astringent, trona is alkaline.

Odor is not emitted by minerals as found in nature, except by the hydrocarbons, many of which have a bituminous odor. It is, however, developed in many minerals by friction, or heat, or by breathing on them.

Soft minerals generally have a smooth or greasy feel, e. g., sepiolite and talc; minerals with a hackly fracture feel harsh, e. g., copper.

Chemical Mineralogy.— The chemical composition of a mineral is its most important characteristic. It is, therefore, essential that the student of mineralogy should have some knowledge of the fundamental principles of chemistry (q.v.). Chemical mineralogy includes the determination of the composition, chemical properties and proper grouping of minerals and the methods of distinguishing the various species. All of the eighty or more elements are found in minerals, but only about eighteen of them occur in nature uncombined. They are grouped into metals and non-metals. Nearly all mineral species are compounds of one or more metals with one or more of the non-metals. The simplest of these compounds consist of the metallic elements combined with oxygen (oxides), sulphur (sulphides), arsenic (arsenides), or some similar non-metallic or semi-metallic elements. A few acids and bases (see Chemistry) occur among minerals, but about three fourths of all described mineral species are salts, or compounds of acids and bases. The chief salts occurring among minerals are the chlorides, carbonates, sulphates, phosphates, arsenates and silicates, the last being by far the most numerous. It is one of the charms of the study of mineralogy to note the relationships existing between the various groups. The blowpipe (q.v.) is a most important aid in identifying minerals by determining their component elements (see Blowpipe Analysis). In order to ascertain the exact chemical composition, which is essential in describing a new mineral, a complete quantitative analysis is requisite (see Chemical Analysis).

The recent production, in the laboratories of French chemists, of crystals having the same chemical composition as the natural minerals, is of very considerable interest as throwing light on the methods by which minerals, such as diamond, may have been formed in nature. Most of the common minerals have been duplicated by these so-called "artificial minerals," while artificial rubies of great beauty (see Ruby) are commanding high prices.

Descriptive Mineralogy.— The proper description of minerals may be briefly summarized as including (1) classification; (2) form and structure; (3) physical properties; (4) chemical composition; (5) distinguishing characters; (6) occurrence.

Various schemes of classifying minerals have been proposed, one of the most popular being the grouping under their most prominent metal. The only one which is strictly scientific is that which arranges similar compounds together in one class, further classifies them according to the minor relations between them, and then by their crystal form and other physical properties. This scheme, which is now almost universally adopted, is as follows:

SCHEME OF CLASSIFICATION.

I. *Native Elements.*
II. *Sulphides, Selenides, Tellurides, Arsenides, Antimonides.*
III. Sulpho-salts.— *Sulpharsenites, Sulphantimonites, Sulphobismuthites.*
IV. Haloids.— *Chlorides, Bromides, Iodides, Fluorides.*
V. *Oxides.*
VI. Oxygen Salts.
  1. *Carbonates.* 2. *Silicates, Titanates.* 3. *Niobates, Tantalates.* 4. *Phosphates, Arsenates, Vanadates, Antimonates, Nitrates.* 5. *Borates, Uranates.* 6. *Sulphates, Chromates, Tellurates.* 7. *Tungstates, Molybdates.*
VII. Salts of Organic Acids.— *Oxalates, Mellates, etc.*
VIII. *Hydrocarbon Compounds.*

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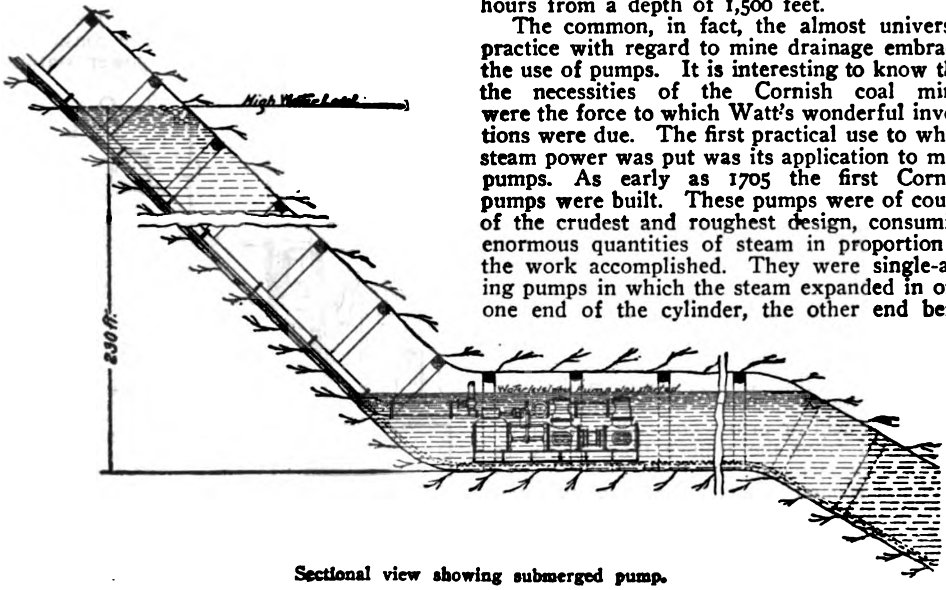
Miners, Western Federation of. See Western Federation of Miners.

Minersville, mī'nėrz-vĭl, Pa., borough, in Schuylkill County; on the west branch of the Schuylkill River, and on the Philadelphia & R. and the Lehigh V. R.R.'s; about 45 miles north by east of Harrisburg. It is situated in the hard coal region, and its chief industries are connected with mining and shipping coal. Some of its industrial establishments are machine shops, foundries, lumber and brick yards. Pop. (1890) 3,504; (1900) 4,815; (1910) 7,240.

Minerva, mī-nėr'va̧, in Roman mythology, a daughter of Jupiter, and one of the great divinities of the ancients. She was looked upon as the patroness of all arts and trades, and her annual festival, called Quinquatrus, lasted from the 19th to the 23d of March inclusive.

Mines, American. See AMERICAN MINES.

Mines, Drainage of. There are but two practical methods of mine drainage: adits, or drainage tunnels, and pumps. The most conspicuous example of the drainage tunnel in the world is probably the Sutro Tunnel, which drains several adjacent mines on the great Comstock Lode. This tunnel is driven four miles from the Carson Valley to where it intersects the Lode, at a depth of 1,600 to 2,000 feet below the outcrops. It, of course, keeps the mines free of water to that depth. Some idea of the magnitude of this work may be gathered from the fact that it consumed nine years in the building and cost $7,000,000. It discharges 12,000 tons of water daily, and it is estimated that it would require the expenditure of $3,000 a day to pump this water from the mines. The obstacles in connection with this tunnel were stupendous, heat, gases, and quicksands were encountered and had to be overcome. The credit for its successful completion is due to Adolph Sutro, the promoter and tireless backer of the work, and to his engineer, Alfred Craven, who executed it.



Sectional view showing submerged pump.

Though mineral deposits are often opened by adits, or tunnels, since in this way the actual working costs are reduced to a minimum, yet tunnels can be driven to advantage only where conditions are such as to ensure a return on the great initial expense. Consequently most shallow mines, and practically all deep mines, are opened by shafts, and the water has to be forced to surface, or to the level of an adit leading to surface. The most primitive way of draining a mine not opened by an adit is to bail out the water in rude leather buckets by man-power. This method was used by the Romans at their mines in Spain and elsewhere, and may still be employed in some remote corner of the world. It is a method for slave labor, hence it was used by the Spaniards in their ruthless search for the precious metals in Mexico and South America. Another way of getting water to surface is to hoist it in buckets, used also for ore, or in tanks of special design. Mines have been drained thus for over a thousand years, and countless prospect holes and mines making little water are so drained to-day. A large scale development of hoisting water is practised at several deep shafts in the Pennsylvania anthracite region, where steel tanks holding as much as 2,600 gallons each are quickly lifted from depths of over 900 feet by powerful engines. The largest of these water hoists, that at the Lytle shaft, not far from Pottsville, has a capacity of nearly 4,000,000 gallons in 24 hours from a depth of 1,500 feet.

The common, in fact, the almost universal, practice with regard to mine drainage embraces the use of pumps. It is interesting to know that the necessities of the Cornish coal mines were the force to which Watt's wonderful inventions were due. The first practical use to which steam power was put was its application to mine pumps. As early as 1705 the first Cornish pumps were built. These pumps were of course of the crudest and roughest design, consuming enormous quantities of steam in proportion to the work accomplished. They were single-acting pumps in which the steam expanded in only one end of the cylinder, the other end being open, and the cylinder being connected to one end of a walking-beam, the other end of which was attached to a long chain of rods running down to the pump plunger at the bottom of the shaft. The expansion of the steam forces this plunger to rise, and it falls again by gravity at the end of the stroke. Prior to the use of steam these pumps had been used for many years with horses to supply the power. It is from this source that we have obtained our common measurement of steam in horse-power units. These old pumps have hardly yet disappeared from use, the writer himself having seen one in northern Pennsylvania, which had been abandoned only a few years.

The problem confronting the engineer in designing mine pumps is an exceedingly difficult one, the lifts frequently ranging up as high as 2,000 feet to a single stage. Some idea of the volume of water required to be lifted may be gathered from the fact that for every ton of anthracite coal taken out in Pennsylvania, 15 tons of water are pumped to surface. A large percentage of mine water is of a very highly acidulous nature. In the anthracite fields of Pennsylvania, the bituminous fields of West Virginia, and the copper mines of Montana as many as 160 grains per gallon of free sulphuric and other acids are often found in the mine water. Lastly, the pump runners are, as a class, unskilled laborers. Taking the pump question up in its entirety, the problems confronting the pump designers in the Pennsylvania anthracite fields are undoubtedly the most difficult of solution. It is natural, therefore, that the present-day type of pump which has supplanted the old Cornish type should have been evolved through hard knocks and practical experience on the ground in question.

The present tendency in mine pump practice is toward a large, centrally located station pump, generally placed near the bottom of the mine shaft, to which point all the water in the mine is drawn. This method is, of course, far more economical than placing various small pumps in different parts of the mine, although, owing to the difficulty of draining all the water to one point, the large station pump is frequently supplemented by smaller pumps, which throw to it the water from certain sections of the mine.

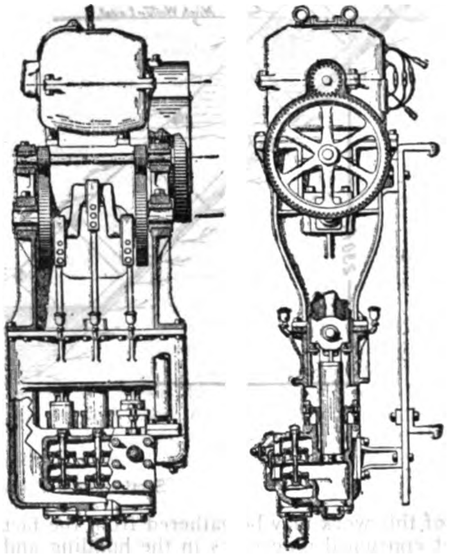
While the steam-driven, direct-acting pump is the type most used for mine drainage in the United States, in Europe special types of pumps, little seen in this country, are used. These types include hydraulic pumping engines, centrifugal pumps built to force water several hundred feet vertically at one lift, and what are known as express pumps, pumps having mechanically-operated valves and driven at comparatively high piston speeds; that is, 100 to 150 revolutions of the fly-wheel per minute. In general, mine pumps made by American firms are planned to meet severe conditions. They will handle, day after day, with a minimum of attention, water that may be acid or gritty, and will call for no greater skill from the runner than ability to use a monkey wrench. A pump built to give the highest economy in power consumption can not meet such conditions successfully, for it requires careful supervision. This ability to meet the most severe conditions explains why American-made mine pumps are found at remote camps in distant countries. The type evolved by our manufacturers reaches its highest development in the duplex direct-acting pump with triple expansion steam end, using a condenser, and having the water end broken into small units. Such pumps are built large enough to handle 1,000 gallons of water a minute against a head of 2,000 feet.

Many coal mines continue to use single-cylinder and compound pumps rather than those of the triple expansion type. This is considered good economy where the cost of fuel is very low. The reduced first cost, the lessening of the amount of repairs, and the more simple construction rendering the pump less liable to mismanagement at the hands of the average pump runner than would be the triple expansion pump, offsetting, in the minds of many, the increased cost of fuel.

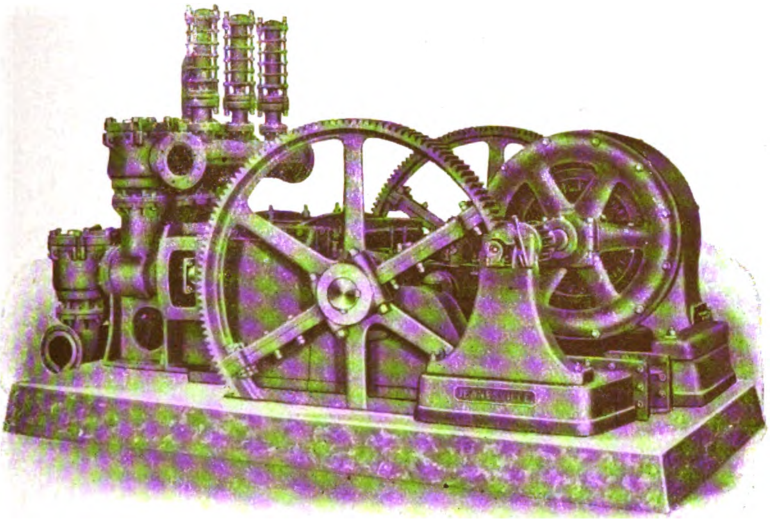
Some idea as to the tremendous strain to which mine pumps are subjected may be gathered from the following case:

The water in the Jeanesville mine of the Lehigh Coal Company is very highly acidulous This company has been using a single-cylinder pump of the Jeanesville type in its No. 4 slope for the past 20 years. Two years and a half ago there was a flood in this valley and the mine was submerged to a depth of 230 feet. Sinking pumps were placed in the shaft and the water was pumped down to the top of the old station pump. As soon as the valve in the steam-pipe was exposed above the water level, a pump runner swam into the pump-room and turned on the steam. The pump, after having been in acid water for 20 years and submerged and in disuse for two and a half years, instantly started to work, and has now completely rid the mine of all surplus water, and active work has been recommenced.

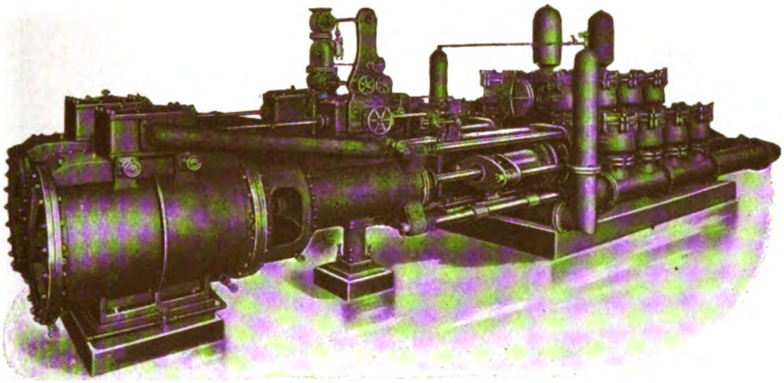
Electricity is rapidly coming to the front as a motive power for running mine pumps. The reasons for this are not far to seek. All steam lines are eliminated from the mines, with their necessary repairs and annoying heat. Electrical transmission losses are practically negligible as compared with steam transmission losses. This is a very serious factor when one considers the necessary distances from the power station at which the pump must often be placed. Small electrically-driven pumps at considerable distance apart in the mine may be operated with much greater economy than a number of small steam pumps. This feature precludes the necessity of expensive interior drainage for a central station, which is often a very considerable factor. A horizontal triplex double-acting electric pump typifies the highest development yet reached in electrically-driven pump machinery. This pump was built for the coal department of the Delaware, Lackawanna & Western Railroad Company at Avondale, Pa., to drive 1,150,000 gallons per day to a vertical height of 800 feet. The water end is wood-lined throughout to resist corrosive acid water. Wood-lining is a point which should not be passed without some comment.



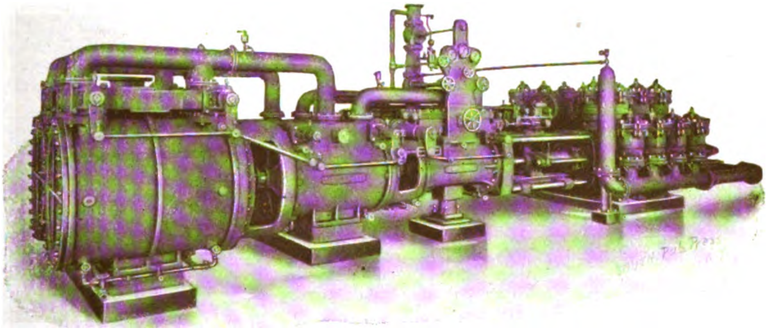
Triplex single-acting electric power sinking pump.



9" x 12" Horizontal Triplex Electric Pump. Capacity, 400 gallons per minute against 1,000 vertical lift. 150 H. P. G. E. induction motor. Built for Compania de Penoles, Mapimi, Mexico.



The Standard 'Anthracite' Pattern, for vertical lifts up to 750 feet.



19" x 27" and 44" x 9" x 36" Triple Expansion Duplex Pump, fitted with Corliss valves. 1,000 gallons per minute against 1,000 feet lift. Built for Acadia Coal Co., Stellarton, Nova Scotia.

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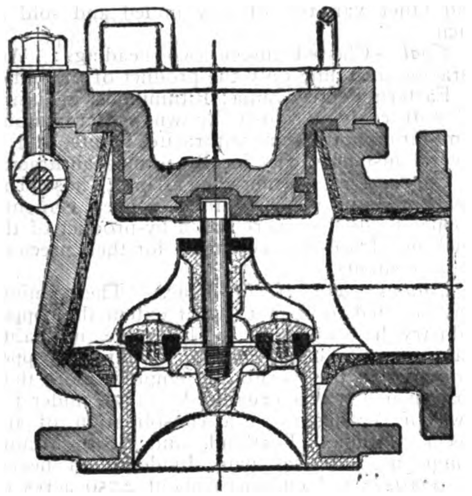
It can readily be seen that water containing as much sulphuric acid as does the water in the mines in question would eat through the very best iron in a short time. Attempts have been made to use phosphor bronze, but this adds enormously to the first cost, and even phosphor bronze is destroyed in time. Wood-lining seems to be the only safe preservative, but it has been an exceedingly hard problem to line valve chambers in such a manner that the wood-lining would stay in place. This problem is one which of necessity has been solved on the ground where wood-lining is an absolute necessity, and practically all the wood-lining done in America is that known as Jeanesville wood-lining, so named for a small Pennsylvania mining town, where this preservative method has been in use for some 40 years. The action of acid water petrifies the wood-lining and makes it imperishable. Indeed, it has happened that the valve chamber has been destroyed through acid water dripping on and eating away the outer surface of the iron, while the inner wood surface still remains perfectly intact.


Sectional view valve chamber showing wood lining.

When a mine shaft is being put down, sinking pumps are used. These pumps are built of a light portable type and can be let down and hung from a beam or placed as is most convenient. It is necessary to use this type as the shaft is being driven down, for every time the bottom is blasted it is necessary to hoist up the sinker to get it out of the way of the blast. Electricity is rapidly supplanting steam as the power for driving sinking pumps, because, as is obvious, it is far easier to raise the electrical conductors from the shaft to prepare for blasting than to lift many feet of heavy steam piping.

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Mines, Submarine. See SUBMARINE MINES.

Mines and Mining. The mining industry in the United States was not important until after the opening of the 19th century, agriculture being the predominating industry. Numerous exploring expeditions were conducted during the early history of the country for the purpose of locating mineral deposits, but with little success. The history of coal mining in the United States affords a good illustration of the general development of the mining industry. In 1820 the first cargo of anthracite coal was sent to Philadelphia. The annual consumption of all coal in 1847 was about 3,000,000 tons; in 1909, the production of anthracite coal amounted to 81,059,159 short tons and the production of bituminous coal to 379,744,257 short tons, making the total production 460,803,416 short tons; in 1910, the production of coal, anthracite and bituminous, amounted to 371,288,123 short tons; the value at the mines (1909) was $554,902,624.

The smelting of iron ore was carried on to some extent in Massachusetts as early as 1702. The production of iron ore in 1840 was about 300,000 tons, and the production of pig iron from the ore in Pennsylvania, in the same year, amounted to 98,395 tons. The Lake Superior region was opened in 1844 and about 800 tons of blooms were shipped from the region in 1853. In 1909, the production of iron ore in Pennsylvania amounted to 666,889 long tons and in the Lake Superior region to 41,942,969 long tons, the production of the two districts amounting to 42,509,858 long tons or 80.2 per cent. of the 51,294,271 long tons reported for the United States. At the present time the United States contributes two-fifths of the entire world's product of pig iron, which, if loaded into ordinary freight cars, would make a train extending over 10,000 miles, or two-fifths around the earth.

Early in the 19th century gold was mined to some extent in North Carolina, and for a number of years following 1829 considerable quantities were produced throughout the Southern States. The discovery of gold deposits in California in 1848 gave an impetus not only to the search for precious metals, but also to mining enterprises of all kinds throughout the country. The production of domestic gold in 1853 deposited at the United States Mint and its branches was valued at $55,622,051 — $55,113,487 of which value was obtained from California. The annual production at the present time is $100,000,000, the gross value of a fine ounce of gold being $20.24.

The evolution of scientific mining has never been more perfectly demonstrated than in the Black Hills. It is the story of the first crude attempts up to final completeness. The yield of gold has been supplied by four distinct and dissimilar sources — placers, conglomerate beds, quartz lodes, and refractory or blanket deposits. The first discoverers found placer gold in the gulch creeks. The discovery and working of these rich placers was immediately followed by the opening of the conglomerate or cement beds. As soon as machinery could be secured the milling of these ores sustained and increased the production established by the rich but waning placers. Eventually the production of the limited area of the conglomerate beds was relieved by the milling of ore from the permanent quartz veins. Some years later when the railroads came, an avenue was opened for shipment of the silicious ores. Since that time this permanent source of supply has been a large and growing factor in production, more especially in late years when smelters and numerous cyanide mills have been established at many points convenient to the mines. The importance of the mining industries is due not only to the magnitude of the aggregate production, but also to the great number of different minerals mined, and the numerous uses to which they are applied. The development of these industries has occurred very largely since 1880, as many of the minerals now prominent were not mined in commercial quantities before that year. The existing diversity of metals is largely the result of processes applied to the reduction of the minor metalliferous minerals; while the great absolute increase in quantity and value of mining products, in number of people employed and in yearly wages paid, is due mainly to the development of the major minerals, the great variety of uses to which the minor ores and the metals derived from them can be put has furnished a constant incentive to increase their production.

The organization of the United States Geological Survey, in 1879, was the first step in the scientific investigation of the mineral deposits of the country as a whole. The continued labor of this body, assisted by systematic geological investigations in most of the States, has produced a volume of information concerning the location, character, and extent of the deposits of the minerals in the following classification:

Abrasive Materials.— Buhrstones and millstones, corundum and emery, crystalline quartz, garnet, grindstones and pulpstones, infusorial earth, tripoli and pumice, oilstones, whetstones and scythestones. This classification includes abrasives occurring as rock formation and such abrasive constituents of rock as are mechanically separated from their associated minerals.

Asbestos.— Including two distinct minerals, one being a variety of amphibole and the other the fibrous variety of serpentine, known as chrysotile.

Asphaltum and Bituminous Rock.— Including the hydrocarbon rocks having an asphaltic base — as bituminous limestone and sandstone — and some of the purer forms of bitumen, as elaterite and uintaite.

Barytes.— The mineral barite, known commercially as barytes, and often called heavy spar, from its high specific gravity, used principally in the manufacture of paints.

Bauxite.— Most of the bauxite mined in this country is used as a source of the metal aluminum. The quantity used in the manufacture of chemical salts is comparatively small.

Borax.— The most important salt of boric acid, used for a flux in soldering metals, for making enamels, for fixing colors on porcelain, as a preservative of food, and as a soap, is in this country derived mainly from the colemanite deposits of California, although a little is produced from the marsh deposits of California, Nevada, and Oregon.

Cement.— Hydraulic cements in these three general classes; *Portland Cement* is a compound consisting essentially of lime, silica, and alumina, produced by intimately mixing some form of calcium carbonate with clay. This mixture is calcined and the resulting clinkers are ground to a fine powder. *Natural-rock Cement* is produced by calcining a natural product, such as an argillaceous limestone, possessing the proper proportions of lime and clay for hydraulic cement, and usually considerable magnesia. *Pozzuolana*, or slag cement, produced by mixing with slacked lime a natural volcanic scoria or granulated blast furnace slag of suitable composition. Invention has played an important part in the development of the cement industry, both in the improvement of cement compositions and processes of manufacture, and in the perfecting of methods and machinery, whereby the cost of manufacture has been greatly reduced and uniformity of product secured.

Clay.— Including kaolin, ball clay, fire clay, slip clay, stoneware clay, pipe clay, terra cotta, and other varieties of clay mined and sold as such.

Coal.— Classed under two headings: Anthracite, including only the product of the mines in Eastern Pennsylvania; Bituminous, including all soft coals variously known as bituminous, semi-bituminous, semi-anthracite, lignite, and in several instances coal locally termed anthracite.

Copper Ore.— Embracing all ores whose principal or only value is their copper contents. Copper is also recovered as a by-product of the smelting of ores valued chiefly for their precious metal contents.

Calumet and Hecla Mines.— These mines may be cited to show to what extent the copper industry has advanced. This mine, in reality many mines in one, is one of the largest copper producers in the world, and employs more than 5,000 men. It was organized in 1871, under the laws of Michigan, as a consolidation of the Hecla, Calumet, Portland, and Scott Mining Companies. It has paid dividends of nearly $100,000,000 and embraces about 2,750 acres of mineral lands. The mine proper is opened on the Calumet conglomerate, which, to the north and south, has proven unprofitable wherever tried, though the underlay of the lode, opened by vertical shafts, has given good returns. The Calumet Mine at the north, the Hecla in the centre, and the South Hecla at the south, form one continuous mine, developing the Calumet conglomerate by inclined shafts. It has suffered severely from underground fires. The amigdaloidal trap rock, carrying native metal, cannot burn, like the copper ore mines, rich in sulphur, such as the Anaconda, United Verde, and others, but the old timber eventually becomes nearly as inflammable as so much tinder. The service and equipment of Calumet and Hecla is the most complete known in any mine. With rare exceptions everything is duplicated, to prevent possible delays or suspension through fire or accident. It owns about 1,200 houses occupied by employees, and more than 1,000 dwellings are owned by employees on lands leased from the company. The company also owns a large hotel, a free club-house for employees, a free library, and there are more than 30 churches occupied by a dozen different denominations. The company maintains a hospital for employees, noted for its complete surgical and laboratory apparatus. Nearly a dozen physicians are on the hospital staff. A fire department and three systems of water-works are liberally maintained. The stamp mills are located at Lake Linden, four miles from the mine; the smelting plants are located at Lake Linden and Buffalo. Sufficient mineral is shipped during the season of lake navigation, April to November, to keep the Buffalo works supplied for the entire year. The company operates a fleet of steel steamers and barges for carrying down mineral and bringing back soft coal. The mills treat about 5,750 tons of rock daily, securing therefrom an average of about 45 pounds of fine copper per ton. Mineral, or crude copper from the mills, runs about 60 per cent. copper.

Flint and Feldspar.— In reality a crystalline or vitrous variety of quartz, there being no production of true flint in the United States. The crystalline quartz, prepared for wood finishing, is usually classed under abrasive materials of the group of feldspars. Orthoclose is the most ordinary species and the one most commonly mined in this country. Both flint and feldspar are used chiefly in the pottery and porcelain industry.

Fluorspar.— Frequently known as fluorite, being a calcium fluoride, varied in color, used chiefly for flux and the manufacture of hydrofluoric acid.

Fullers Earth.— Including various colored, smooth, greasy, clay-like substances, much lighter in silica than ordinary clay, the chief use of which is for clarifying cottonseed and lubricating oils.

Gold and Silver.— Embracing (1) placer mines, which produce gold usually associated with silver, and (2) deep mines, which produce gold- and silver-bearing ore, some of them being equipped with reduction works where the ore is reduced to bullion. The silver mines include also argentiferous lead mines. Mexico is the leading silver producing country, the output of her mines exceeding one-third of the world's production; the United States following close behind, with one-third of the world's output. The recent progress in gold mining has been so closely associated with the great Homestake mine, a knowledge of its operations will give a clear conception of the magnitude of the industries.

Homestake Gold Mines.— Since 1877, the properties owned by the Homestake Mining Company have produced $75,000,000, out of which have been paid in dividends about $20,000,000. With the development of its great ore bodies, the company has gradually increased its milling capacity until it is now operating 1,000 stamps, with a crushing capacity of about 4,000 tons of ore per day, and is adding several hundred stamps to its present milling capacity. The company was handicapped in its milling operations by lack of water until the completion of a pipe-line from Spearfish creek to its mills at Lead. This was constructed at a cost of $1,500,000 and will furnish an abundant supply of water for all time. The ore-bearing area of the Homestake belt, as definitely exploited, is approximately one and one-half miles long and one-half mile wide. The ore lies in bodies of great extent. The free-milling character of the ore is pronounced. Practically all the values of the surface ores are extracted by simple amalgamation. During the first 12 years of mining operations no attempt was made to save the concentrates, though the deeper ores gradually became less free-milling. Concentrates have been saved since 1890. For 10 years they were sent to the smelter at Deadwood for treatment, but in 1900 the company erected a 1,300-ton cyanide plant, which is now successfully treating the tailings by this process. The operation of this plant proved to the company's satisfaction that the cyanide process can be used advantageously, and it has erected a second plant of 700-tons capacity at Central City. The company has five main shafts 700, 800, 900, 1,100, and 1,200 feet deep, respectively, the bottom of each shaft being in ore, with the ore-bodies still continuing downward. The ore not only maintains its value with depth, but shows an increase in value. At the 800-foot level there is a solid body of ore more than 600 feet wide which is formed by the union of several veins running from the surface. It is estimated that enough ore is in sight to run the mills at full capacity night and day for 35 years without opening new veins. Nowhere in the world are there to be found such large open-cuts or excavations on the surface from which so many million dollars' worth of gold-ore has been quarried. Besides the immense open-cuts there are 100 miles of underground workings in the property in the shape of drifts, levels, cross-cuts, etc. The company is producing 1,500,000 tons of ore annually. The ore shows value saved of about $4 per ton, netting a profit under present methods of treatment of over $2 per ton.

Stamp-Mills.— In the treatment of gold ores the stamp-mill is not only the simplest, but the cheapest and most efficient method yet devised. It can be built any size the mines warrant from one stamp to a thousand. The most improved pattern has stamps weighing from 1,000 to 1,200 pounds, which are raised by cams from four to six inches, and drop 100 times a minute in mortars. In the larger mills these stamps are arranged in sets of five. The ore is supplied to the top of the mortars by automatic feeders which furnish the exact amount required. The front of the mortars is covered with a strong steel screen perforated so that the finely crushed ore will pass through the screens and out upon the large plates covered with quicksilver. As gold has a great affinity for quicksilver, about 95 per cent. of the free-gold released from the powdered rock will lodge on these plates. The plates are then scraped at intervals, and the scrapings, technically known as "amalgam," melted under great heat in retorts. The quicksilver is driven off by the heat and practically pure gold remains, which is then molded into bars. The process of using cyanide of potassium to extract gold from ore varies in different mills. The general features are the same, the difference being in the details. The ore is first run through heavy rolls which grind it finely enough to pass through a 20-mesh screen. Then the powdered ore is taken automatically by carriers and delivered to iron tanks of large capacity. A weak solution of cyanide of potassium is held in other tanks higher up and is turned in from the bottom of the ore tank. The cyanide percolates up through the ore until the top is covered to a depth of one or two inches. This condition continues from 40 to 72 hours, when all the gold in the ore is dissolved and held in the solution by the cyanide. The solution is then drawn off from the bottom, and as it comes out of the ore tank, runs through a box of very fine zinc shavings. As the contact of the solution with the zinc shavings causes an instant precipitation of all the gold carried, it drops to the bottom of the box.

After the first solution is drawn off the tanks are filled with clear water, which soaks through the pulp. This also passes through boxes containing zinc shavings to save any gold that may remain in the sand — a process which is called «washing out.» After the gold has all been extracted the tanks are emptied of the pulp and cleaned up to receive another load. The zinc shavings and gold are taken to the retort room, where the zinc is eliminated and the gold run into bars.

Graphite.— Including the crystalline and the amorphous varieties. The crystalline is largely used in the manufacture of crucibles, lubricants, and lead pencils; and the amorphous in the manufacture of paints, lubricants, and greases.

Gypsum. The hydrous sulphate of lime (calcium), used chiefly in the manufacture of plaster of Paris and as a fertilizer.

Iron Ore.— In different varieties classed as the red and brown hematites, magnetites, and carbonates, which include not alone ore used in the manufacture of pig iron, but also manganiferous iron ore used in the production of spiegeleisen and the argentiferous manganiferous iron ore used as a flux in the smelting of ore containing precious metals, and as a «fix» in puddling. The greater portion of the product reported for Colorado is of the latter class. Its precious-metal contents alone are not sufficiently valuable to pay for smelting, but the iron and manganese it contains render it especially valuable as a fluxing medium when mixed with gold and silver ores in the smelter.

Lead and Zinc Ore.— Chiefly the nonauriferous and nonargentiferous lead and zinc ores. See LEAD INDUSTRY.

Lithium Ore.— Lithium minerals (Lepidolite and Spodumene) and metal or salts produced from them. The salts are used principally in the preparation of mineral waters and effervescing lithia tablets. The world's annual production of lithium carbonate, which is the principal salt used, is about 100,000 pounds and is mostly manufactured in Germany,

Magnesite.— Magnesium carbonate employed chiefly in the manufacture of magnesite bricks for the refractory lining of furnaces, and the manufacture of carbon-dioxide gas. When crude magnesite is decomposed by sulphuric acid there is a by-product of magnesium sulphate, or Epsom Salts.

Manganese Ore.— Used chiefly in the manufacture of Bessemer steel and of chemicals; also of value as a flux. Manganese is not found in a metallic state in nature, but usually occurs as an oxide, carbonate, or silicate in combination with one or more of the other elements. The oxides are the most common of manganese minerals, but Rhodonite and Rhodochrosite — the silicate and the carbonate — are frequently met. The commercially important ores are the oxides.

Marl.— Including the green, blue, red, and yellow clayish earths — dug and used as fertilizers, and calcareous marl excavated and used by the manufacturers of cement.

Mica.— Including several varieties — that most commonly found and mined is muscovite. Sheet or plate mica is used chiefly for stoves, chimneys for incandescent lights, and for the insulation of electrical apparatus. Scrap mica is ground to a flour and used in the manufacture of wall papers, lubricants, fireproofing materials, novelties, etc. Scrap mica is prepared by removing the adhering fragments of flint and feldspar and such parts of the mica itself as contain foreign ingredients. For sheet mica the blocks as mined are split into sheets and cut to a size.

Mineral Pigments.— Embracing the production of ores in the manufacture of mineral paints, consisting of iron ores (red and brown hematite), which are not included with iron ores used in the manufacture of iron; clay or other earths, containing iron, used in making yellow, red, and brown pigments (such as ochre, umber, sienna, etc.), carbonate of zinc, slate and soapstone used as a pigment. Mineral paints are used chiefly where great resistance to the action of the weather is desired.

Monazite.— Essentially an anhydrous phosphate mined from placer deposits and is of value for its oxides of thorium, cerium, lanthanum, and didymium, which are used in the manufacture of cylindrical hoods for incandescent gas lights. The cerium oxide is also used in small amounts in pharmacy.

Natural Gas and Petroleum.— These are intimately connected in composition and occurrence, one being a gaseous and the other a liquid hydrocarbon, and with but few exceptions they are associated in all of the fields, the gas occupying the upper portion of the same strata which contains the petroleum. In many localities, during cold weather, a small portion of the more volatile naphthas are often condensed from the natural gas and deposited on the pipe lines. Of the combined value of the two, petroleum amounts to a little less than 70 per cent., and the natural gas to a little more than 30 per cent. In combined value they rank next to pig iron and coal in the list of the crude minerals. Petroleum has penetrated every quarter of the globe and is without a rival in its illuminating and lubricating qualities. See NATURAL GAS AND PETROLEUM.

Phosphate Rock.—The name phosphate is applied to the salts of phosphoric acid, chiefly *orthophosphoric acid,* which is a tribasic acid and from which a great variety of salts are obtained. Calcium phosphate, or, more strictly speaking, tricalcium orthophosphate, is the most important of the mineral phosphates, and this class forms the large mineral deposits utilized in the manufacture of fertilizers.

Precious Stones.— Generally found in the United States by accident, or in prospecting for, working, or developing mines of other minerals, or in the working of gravels containing gold, monazite, etc. The companies which carry on the search for stones, with some approach to regularity, produce sapphire, tourmaline, beryl, chrysoprase, opal, and turquoise. In addition to these, certain quantities of emerald, peridot, several varieties of quartz — such as rock-crystal, smoky, rose, gold, and rutilated quartz — amethyst, agate and moss agate, and silicified wood, also garnet (pyrope and rhodolite), amazon stone, chlorastrolite, mesolite, pyrite, anthracite ornaments, and catlinite are produced in this country in varying amounts.

Quicksilver.— Confined in production to California and Texas. It occurs native, but the chief ore from which it is obtained is cinnabar, which is the sulphide. The chief use of mercury is in the metallurgical treatment of gold and silver ores by amalgamation. It is also ememployed in medicine and in the manufacture of vermilion, a pigment.

Steel-hardening Metals.— Including metals used or experimented with in the hardening of steel, although some of them are used more generally for other purposes. The metals included in this class are nickel, chromium, tungsten, molybdenum, titanium, uranium, and vanadium. The mineral classifications, differing from the metallic here given, are chrome ore (chromium), nickel and cobalt (nickel), and rutile (titanium). There is still another metal that naturally comes under this head, namely, manganese; but on account of its comparatively large production, it is treated separately.

Stone.— Including limestones and dolomites, marble, sandstones and quartzites, silica sand, siliceous crystalline rocks, and slate. Under the classification of siliceous crystalline rocks are included granite, gneiss, mica schist, lava, andesite, syenite, quartz porphyry, trap, basalt, diabase, diorite, and gabbro. Under sandstones and quartzites are included sandstone, calcareous sandstone, bluestone (New York and Pennsylvania), jasper (southern Minnesota), and volcanic lava (Douglass County, Colorado). Under limestones and dolomites are included the limestone used for iron flux and in the manufacture of lime.

Sulphur and Pyrite.— Occurring as an elementary substance and also widely distributed as sulphates and sulphides of many of the other elements. In the crude state sulphur is used for vulcanizing rubber, and in the manufacture of gunpowder and matches; in its refined state it is used in medicine. A small quantity of crude sulphur is used in the manufacture of sulphuric acid, but most of this acid is made from the mineral pyrite.

Talc and Soapstone.— Including a small production of serpentine, and all of the pyrophyllite, mined and used for the same purposes as talc. The name talc has been used commonly and yet erroneously for a number of minerals similar to it in physical properties but mineralogically distinct. The fibrous and foliated varieties, which are the purer forms, are commercially known as talc; while the other material, called soapstone, is a somewhat variable, massive rock in which talc is the principal constituent. The foliated talc is the most valuable, being pure and very free from grit, so it can be used in the manufacture of talcum powders, etc. Occasionally this variety is so compact that tailors' pencils are made from it, in which case it brings the highest price of all. Certain varieties of the massive talc are also pure enough to be used for flour talc, but the greater portion of it is used in the manufacture of soapstone articles. Most of the fibrous talc is obtained from New York, and is used almost exclusively in the manufacture of paper.

Tin.— Very limited in production. Most of the tin of commerce is obtained from the dioxide, called cassiterite by the mineralogist and tinstone by the miner. It is used principally in the manufacture of tin plate (sheet metal coated with tin) and forms a part of several important alloys.

The use of power is becoming more general in all branches of productive industry. In the mining industries it is employed for a variety of purposes, the chief of which are the operation of hoisting, draining, ventilating, conveying, drilling and cutting machinery, derricks, steam shovels, locomotives and hauling engines. It is also employed extensively in the operation of machinery used in crushing, screening, cleaning, or for otherwise treating the crude material.

Electricity in Mining.— Of late years the electric motor has been utilized for all classes of work — drilling, coal cutting, hoisting, pumping, ventilating, etc., increasing the output of the mine and reducing the cost of production. There are many economies resulting from the general flexibility and applicability of the electric system, making possible the centralization of the power generating plant, the laying out of the mine in the manner most conducive to economical working, the improvement of mine conditions, decrease in the number of men required to operate boilers, engines, pumps, blowers, etc., a reduction in the cost of repairs, the installation of hoists, blowers, or pumps at points where they would otherwise not be used on account of distance from the central power plant, the avoidance of the objectionable exhaust from steam engines, a saving in space requirements for machinery in general; and, finally, the provision of a safe, efficient, and economical means of lighting the mine.

The electric systems suitable for the operation of mining plants are as follows: (1) Direct current for haulage, power, and lighting. (2) Direct current for haulage, and polyphase alternating current for power and lighting. (3) Polyphase alternating current at high potential for power distribution to substations, where it is converted into direct current or to low potential alternating current, or both.

The first system is adapted to mines in which power is not transmitted a great distance. The generating station should contain two or more direct current dynamos connected according to either the two-wire or the three-wire system. If the three-wire system is used, it will be found advantageous to install the Westinghouse three-wire generator, which supplies direct current at two voltages, one twice the other; otherwise it will be necessary to have two machines always in operation, or some more complicated form of balancing apparatus. The three-wire generator can be operated on the three-wire system in connection with other direct current machines of the ordinary two-wire type.

The second system is adapted to the same class of work, but embodies a further advantage, which is particularly important in the case of coal mines. The alternating-current induction motor with revolving secondary of the squirrel cage type has neither brushes, commutator, slip rings, nor other moving contacts, is, therefore, entirely sparkless, and its use involves no danger from explosion or fire. The absence of brushes or commutator is, moreover, an immense advantage where motors are intrusted to the care of unskilled labor and exposed to dust and dirt. The power plant for this system must necessarily contain either a direct-current dynamo to operate the haulage system and an alternator for power and lighting, or a double-current machine which generates both direct and alternating current. If the amount of direct current required is relatively small, it may be advantageous to install alternating-current generators with a rotary converter or motor-generator to supply the direct current.

The third system is adapted to those cases where a large number of mines can be operated from one central power station. This plan greatly reduces the number of men required in the power plant, as well as the cost of buildings and apparatus. It also makes possible the utilization of water-power, thus doing away with steam boilers and firemen, and permitting inexpensive water-wheels to be substituted for costly steam engines. By the use of a high voltage, alternating current may be transmitted economically to almost any distance. At the mines it may be transformed into direct or alternating current of a voltage suitable and safe for the operation of mining machinery.

Electric Locomotives.— The saving effected by the use of electric locomotives in mine work is immense. The cost of maintenance is less than with any other system of traction, but the greatest saving, as compared with either animal or mechanical haulage, is in the cost of attendance. The compactness of the electric locomotive makes it perfectly adaptable to low and narrow entries. There are no moving parts exposed to external injury; the mechanism is of the simplest character and the running parts are easily accessible. It may be used upon temporary tracks and in crooked passageways where the installation of a rope-haul system would be impracticable. An electric locomotive may also be used to distribute the cars to room partings, work which with a rope system would require extra men and mules. For the hauling of slag to the dump it is the most economical and serviceable motor power.

Compared with the compressed-air locomotive, the electric locomotive shows a considerable saving in the cost of plant maintenance. The compressing station may be fairly set off against the generating station, except in the matter of power efficiency, in which the latter has a marked superiority. In respect to transmission, the compressed-air system is also decidedly inferior. The pipe lines are costly and hard to keep tight. They are easily corroded by the acid waters present in mines. In some instances it has been found necessary to renew the pipe lines as often as once every year, at great expense and delay. The compressed-air locomotive itself must be idle a considerable portion of the time while charging and with its immense air-tanks it is generally an unwieldy affair. It should also be remembered that the adoption of the compressed-air locomotive implies either the loss of the many advantages of electric power in other directions, or else an expensive duplication of plant.

Electric Hoists.— The great utility of the electric hoist in mining work is due to the ease with which the electric motor can be controlled and to the fact that an electric hoist equipment requires little space and may be installed wherever needed. Electric distribution does away with many small boilers and engines, permitting the power plant to be consolidated under one roof. The types of motors most suitable for hoisting work are the direct-current series and compound-wound motors, and the alternating-current induction motor. The series motor is valuable if a very high starting torque is desirable, but close speed regulation is not required. If there is any possibility that the motor might race the compound-wound motor should be used. The compound-wound motor has the high starting torque of the series motor, but resembles the shunt motor in that it will not exceed a certain speed when the load is thrown off. A controller suitable for motors of this class consists of an iron box containing resistance, a commutator composed of a number of contact blocks, each of which is connected to the resistance at a suitable point, and a set of brushes mounted on a rocker arm. The direction of rotation of the motor depends upon the direction in which the controller handle is moved from the neutral point.

Compressed Air.— In many mines where electric-power distribution has been adopted, compressed air is still employed for the operation of small tools, drills, and coal cutters. In such cases, electric motors are used to drive the air compressors, which, in consequence, may be placed conveniently near the point of application of the air, thus avoiding long and complicated systems of piping. Both pumps and compressors require a practically constant torque, or turning moment, in the motor. The speed variation demanded is usually small. If power distribution is by direct current motors should generally be compound wound, and, if necessary, the speed may be varied by means of a rheostat in the shunt field. The series winding prevents the heavy fluctuations of current that would take place in a simple shunt motor when passing through the different parts of the pump cycle. Where hydraulic pumps supply a long line of pipes, a series winding on the motor easily furnishes the heavy torque required for starting. See AIR COMPRESSORS; COMPRESSED AIR.

Electric Motors.— For the operation of fans and blowers, the electric motor has unequaled advantages. When properly constructed and installed it requires little attention and runs continuously day in and day out with only occasional cleaning and oiling. This point is especially important since it is often desirable to locate ventilating fans at unfrequented points and at considerable distances from the power-house. A point which sometimes may be of considerable importance where a large number of motors are located at widely separated points throughout a mine is that the alternating-current induction motor and the direct-current series and compound motors will start and stop with the starting and shutting down of the main generators in the power-house. If by reason of an accident or other cause the current supply is stopped all the fans and other machinery in the mine may be started again promptly when the power is turned on without visiting the different points where the apparatus is located. This is a feature which might be of great importance in many instances. It is possible to start and stop the induction motor at any time from any distant point by simply opening or closing the main circuit. The series and compound motors may also be controlled easily from a distance.

In placer as well as in lode mining, electric power may be employed advantageously for pumping and for hoisting either direct or by derrick. It is essentially applicable to dredging apparatus, since it admits of the operation of dredges where fuel is hard to obtain or expensive and makes possible the carrying on of the work at night.

Compressed-Air Mining Machinery.— Notwithstanding the widespread use of electricity in mine applications involving power, compressed air has many advantages in certain situations. In coal mining it is extensively employed. Fan engines, pumps, etc., can be driven with air without condensation losses, without trouble from dampness, and without fire risks, in connection with the machinery already in place, and perfectly understood by present employees or other labor obtainable anywhere. Rock shafts, rock roofs, tunnels and floors can be reduced to a power basis with great saving in time and cost. Air assists ventilation everywhere, clears away the smoke at once from a room or entry which must be pushed, drains the low spots, or pumps the heaviest floods with common pumps, requiring no more skillful handling than the most careless boy about the works is equal to, and all this beyond the possibility of being drowned out. Blacksmith fires and steam hammers are operated at the touch of the foot. Ventilation is assured in remote places, in case of a choked airway, or any restricted place. The air lines are laid throughout the mine, and the engine-room may be equipped with a powerful fire pump. Each air hose may then be used to carry a strong stream of water to the coal face at need, a pipe line being a factor of safety and not of risk. Compressed air, like electricity, has seen the time when, not being understood, it has been applied wastefully. Air is merely a transmitter of power, just as electricity or a wire rope is; but, correctly used, it is inherently economical, being practically a perfect gas. Important developments are continually being made, and the future promises much in the advancement of compressed-air appliances. See MINING AND MILLING MACHINERY.

Signaling in Mines.— Effective signaling in mines requires a great variety of apparatus, such as telephones, telegraphs, bells, and appliances for sending signals according to the indications upon a dial. Of late years the telephone has advanced beyond other methods of signaling, and special types of instruments, intended for mining work, are made with regard to conditions of exposure, damp, etc. It is generally recommended that telephones be put in all permanently installed motor-rooms, so as to enable the men in charge underground to inform the engineer at once of any breakdown of motors, machinery, etc., and, if necessary, obtain assistance speedily.

Ventilation and Drainage.— In the development and operation of extensive mining enterprises, ventilation and drainage are in many instances a source of expense and cause of numerous difficulties. The cumbersome and expensive Cornish pump system of mine drainage has in late years been largely displaced by modern steam, electric or hydraulic pumping engines, which have a greater efficiency and greatly decreased expense in first cost, as well as in operating expense. The method of mine drainage by means of automatically operated skips has also been improved, and in some instances this method of mine drainage is preferred to any other mechanical means, though where the amount of water to be handled daily is very large a special shaft and hoisting equipment is desirable, if not necessary, in order to admit of the product of the mine as well as materials and men being handled. The means of ventilation have also been improved over old practice by the introduction of large and better ventilating fans and reversible current devices. Although these much desired improvements have been made in the mechanical devices for handling water and for ventilating the workings, the method par excellence for both drainage and ventilation is by means of tunnels.

Tunnels.— In many mining localities long tunnels are justified by the character and value of the mineral resources of the district. Not tunnels a few hundred, or a few thousand feet only in length, run for the development and drainage of an individual property, or a restricted group, but tunnels run for the benefit of whole districts. In the State of Colorado, in Idaho, in some portions of California and Arizona, and also in Utah, as well as in other regions, tunnel schemes of this character are possible, which would drain and ventilate all mines connecting with the main tunnel, and afford an economical means for transportation of all the ores of the mines tributary to such adits. In some districts such tunnels have been run, and in almost every instance the result has proven the wisdom of the protectors of these enterprises. Such operations as these require large capital and energy behind them to push the enterprise to a completion as quickly as possible, as this is the only proper way in which to handle mining propositions of this magnitude and character. In a district of superficially developed mines — down 1,000 feet or less — where there are large bodies of profitable ore, it is the usual experience to find the values, if not decreasing with depth, to be associated with new combinations, and unfortunately it is usually the case that the change in character of the ore necessitates a change in treatment with an increased expense per ton on that account. With increasing depth also comes additional expense for hoisting, ventilating and drainage, and not infrequently of labor as well, for the reason that miners cannot break ground as cheaply under the increasing difficulties and disadvantages as they can nearer the surface. All of these disadvantages the drainage and transportation tunnel minimizes with decreased cost.

System of Mine Ventilation.— In a system of mine ventilation recently proposed and approved for its practicability an air compression furnishes fresh air under pressure to the main supply pipe line, which pipe for convenience is placed in a pipe of larger diameter, this larger pipe leading to an exhauster or another air compressor, the purpose of which is to draw the impure air out of the mine, at or near the working faces, and discharge it into the atmosphere. These main lines are preferably placed on the surface of the ground (or slightly below the surface in a box or trench) parallel with, or just over the main entry, and are connected at intervals with vertical pipes of lesser diameter, said vertical pipes leading through the roof of entries or to one side, or, so as to not interfere with the other mine equipment. The suction or exhaust pipe opens at, or near, the roof of the room or entry and the supply pipes lead lower down and at the sides where hose connections or horizontal branch supply pipes can be added so that the live air can be applied at or near the face of the workings to jet away the noxious gases or drive them into the main air courses in case a fan is also used. The cost of installation of this system will, of course, depend upon local conditions. Separate air courses are not required; their construction would be much greater than the cost of the compressor and pipes and cost for drilling the vertical holes. A mine using compressed air as a motive power could utilize the supply lines for transmitting their power to good advantage for the friction losses are apt to be considerably reduced by the use of larger diameter pipes of shorter lengths.

The large and ever-increasing consumptive power of the United States and other countries has caused a phenomenal growth in the mining industry during recent years. With splendid modern transportation facilities, numerous inventions and perfections in machinery, new discoveries in electricity and motive powers, and the many advantages at the command of the United States, the further development of her mining industries simply awaits the vigorous hand of her bold and enterprising manhood. See AMERICAN MINES AND MINING.

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Mines and Mining, Law of. By United States law public mineral lands, both surveyed and unsurveyed, are open to free explorations, of opening and developing mines, on the conditions established by Congress. A mine located by a compliance with those conditions is the property of the locator, and he may lease, assign and convey it, giving a valid title. The owner of the soil may convey the mineral rights in a distinct grant, and thereby create one freehold in the soil and another in the mines, and each estate is entirely independent of the other, capable of being conveyed or inherited. The purchaser of a mineral right has, as an incident of his purchase, the right to open as many tunnels and shafts in the soil as are necessary to a convenient and complete operation of his property, to deposit the earth excavated upon the premises, erect suitable machinery and buildings, have free ingress and egress, and is responsible to the owner of the soil for abuse of his privilege only. See MINING LAW.

Min'iature Painting, or the painting of portraits on a small scale, originated in the practice of embellishing manuscript books. The art of illumination was expressed by the Low Latin verb *miniare,* and the term *miniatura* was applied to the small pictures introduced. After the invention of printing and engraving this delicate art entered on a new phase; copies in small dimensions of celebrated pictures came to be in considerable request, and, in particular, there arose such a demand for miniature-portraits that a miniature in popular language came to signify «a very small portrait.» The early artists painted on vellum and used body-colors — that is, colors mixed with white or other opaque pigments, and this practice was continued till a comparatively late period, when thin leaves of ivory fixed on card-board with gum were substituted. After ivory was substituted for vellum, transparent colors were employed on faces, hands, and other delicate portions of the picture, the opaque colors being only used in draperies and the like; but during the 19th century, the practice has been to execute the entire work except the high lights in white drapery with transparent colors.

Min'im Friars and Minim Nuns, an order instituted in the middle of the 15th century, and more correctly designated Minim-Hermits of Francis of Paula. They observe perpetual abstinence. The object of the order is both contemplative and active. They belong to the mendicant orders, and possessed, in 1900, several hundred convents.

Min'imum Thermometer. See THERMOMETER.

Mining. See AMERICAN MINES; MINES AND MINING; MINING AND MILLING MACHINERY; MINES AND MINING, LAW OF; MINING ENGINEERING; MINES, DRAINAGE OF; COAL MINING; GOLD MINING, ETC.

Mining and Milling Machinery. Problems in mining may be classified into groups according to their relation to geology, engineering, machinery, and metallurgy; but, as the problems of each group overlap to some extent those of the others, the special consideration of the subject of mining machinery necessarily involves a general consideration of mining methods and results in their geological, engineering, and metallurgical aspects.

Mining methods differ according to the form and geological relations of the mass of ore or other minerals to obtain which the mining operations are instituted. These relations outline two general methods — those applicable to «surface deposits,» and the more complicated methods required in the working of «underground deposits.»

Surface deposits are those in which the mass of ore is of considerable superficial extent and lies on or near the surface of the ground. The first step in this case is to uncover the ore by «stripping» off the overlying worthless material called the «burden.» If this consists of soft earth or gravel it may be removed with pick, shovel, and wheelbarrow, or by the use of steam-shovels, and small tram-cars drawn by horses, mules, or locomotives. If the burden is too hard to be stripped by any of these methods, blasting operations are usually employed. The burden is first blasted off and removed, and the subsequent work of extracting the mineral thus exposed is carried on by benches or terraces along the hillside, so that the cuts will naturally drain into the pit, and the ore will have a favorable grade for its transportation in removal. If the pit is located in level or depressed ground, the use of pumping machinery will become immediately necessary, entailing a heavy expense at the very beginning of the operations. Open cuts are the simplest and most convenient form of excavation, but they expose the men and machinery to the weather, and usually necessitate the abandonment of all operations during the winter. Another method of surface mining consists in the employment of water jets for working auriferous gravels. This is technically known as «hydraulic mining.» Water conducted from great distances and elevations is directed against the ore-bearing gravel banks and beds, in the form of powerful jets through large nozzles called «giants.» The impact of the water under the great pressure due to its heavy fall washes away the gravelly material of the banks with almost incredible rapidity through sluices where the gold is separated from the sand and gravel by amalgamation with the mercury in the riffles of the sluice boxes. The sluices usually consist of a series of 12-foot troughs which empty into one another and often form a line of troughs several hundred feet long. The bottoms of the troughs have corrugations called riffles, and are cut out at intervals and replaced by a grating called a "grizzly." Under the grizzly another broad trough is placed at right angles to the top trough, and empties into another trough which runs parallel to the direction of the top trough and forms the continuation of the main sluice. As the material of the bank is washed through the sluice boxes by a strong stream of water, the sand and gravel is caught by the grizzly while the gold passes through into the lower trough where it amalgamates with the mercury which is frequently sprinkled into the riffles.

Underground deposits are worked by the use of shafts and tunnels driven through the overlying earth and rock into the "lodes" or veins of ore. In these operations the overlying rock is always supported in place over those portions of the mines where the borings are used as passage-ways, and the arrangements for ventilation are more and more carefully made as the workings grow deeper and deeper.

The material thus obtained is prepared by the process of "ore dressing" for the subsequent processes of extraction.

Ore dressing consists of two processes—crushing and separation, which employ two distinct types of machinery.

By crushing, the material is broken up into coarse fragments, or ground into a fine powder, and the valuable ore detached from the worthless rock.

By separation, the valuable ore is concentrated into smaller bulk and weight by being separated from the waste, or in the case of two valuable ores, they are separated from one another.

The selection of the particular types of crushing and grinding machinery is always determined by the character of the ore and the process of extraction for which the ore is prepared.

The processes of extraction may be briefly defined as follows: (1) Smelting processes in which the pure metal is extracted from its ore by fire; (2) amalgamation process in which the metal forms an amalgam with mercury from which it is subsequently separated by the distillation of the latter; (3) chemical processes in which the metal is dissolved by various solutions and then precipitated in solid form by suitable precipitants; (4) electrolytic processes in which the extraction is accomplished by electrolysis.

The crushing and grinding machinery used in mining consists of the following classes of machines:

Rolls.—These are the standard machines for crushing brittle ores which are being prepared for concentration except where fine crushing is required.

Steam stamps are the standard machines for crushing ores containing native copper.

Gravity stamps are the machines most extensively used for fine crushing.

Ball mills are also quite extensively used for fine crushing, and are the most efficient competitors of the gravity stamps.

Pulverizers are used for crushing and grinding ore as it comes from the crusher or rolls, for fine concentration, or for the recrushing of middlings and tailings from jigs for subsequent treatment on concentrating tables or other concentrating machines.

The preliminary crushing is usually accomplished by jaw or gyratory crushers and then the material is passed over to the rolls, stamps, or ball mills. The selection of screens having the proper mesh to crush through is one of the most important details. For purposes of concentration it is usually advantageous to begin by crushing to a coarse size, separating as much of the waste as possible, then recrushing to a finer size and again separating the waste. In crushing gold ores for subsequent treatment by the cyanide process, fine crushing gives a higher extraction than coarse crushing, but it also produces more "slime." Slime is material reduced to an impalpable powder, which when wet becomes plastic, and forms into impervious layers in the tanks, so that the solution is prevented in passing through. It is the most discouraging material against which the cyanide operator has to contend.

The following examples have been selected to illustrate the various classes of these machines:

Fig. 1 shows a general view of a Blake Crusher, a machine of the "jaw-crusher" type.

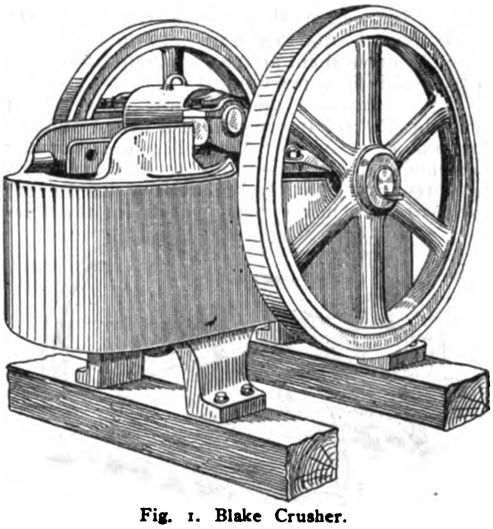

Fig. 1. Blake Crusher.

They are made in dimensions which provide a capacity of receiving rocks ranging from 1½" × 3", to 15" × 24" in size, which they reduce to fragments ranging from 1" to 3" in size, at the rate of 15 to 250 tons per 10 hours of work, according to the size of the machines.

They range in power from ½ horse-power in those weighing 1,000 pounds, to 25 horse-power in those weighing 26,000 pounds, and require a speed of 225 to 250 revolutions per minute for their operation.

Fig. 2 shows a general view of an Austin Gyratory Rock Breaker. It represents one of the strongest and most durable of this class of crushers. It is made in sizes which have receiving openings ranging from 4"x5" to 18"x63", and have reduction capacities ranging from 2 to 200 tons per hour, according to the size to which the material is reduced and the size of the machine. In weight they range from 3,000 to 100,000 pounds, and require from 4 to 150 horsepower to drive them at speeds ranging from 350 to 500 revolutions per minute.

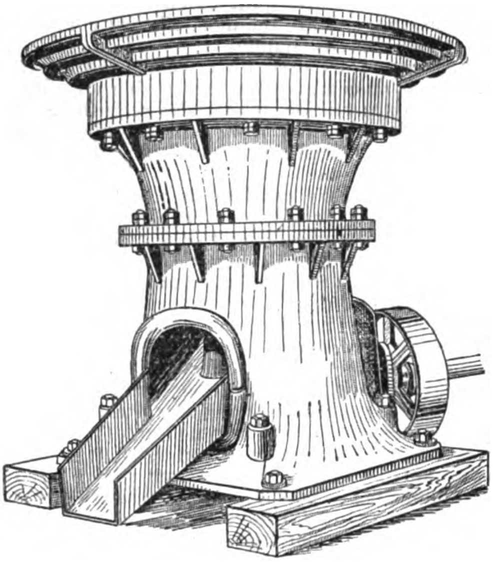

Fig. 2. Austin Gyratory Crusher.

Fig. 3 shows a general view of a set of Crushing Rolls. It consists of a set of stationary and a set of movable rolls; an automatic feed hopper built in sections, so that the wearing parts may be easily replaced; a dust cover; and two, extra heavy, band wheels for the driving belts. The main frame and the journals for the stationary rolls are cast in one piece. The movable journal is held in the centre of the main frame by means of a heavy steel shaft, and the swinging journals are held in place by tension rods which are attached to nests of powerful coiled springs between washers on the rods. These springs are stiff enough to resist the pressure imposed upon them by ordinary crushing without being compressed, and yield only to abnormal strains caused by the accidental passage through the rolls of hard uncrushable substances such as broken drill points, etc. The rolls may be adjusted to a nicety by screwing or unscrewing the nuts on the adjusting bolts, which are attached by a "key colter" to the movable journal and are held in place by lock nuts which rest against the heavy brackets cast on the main frame. The roll shafts are made of the best hammered steel; their bearings are made of phosphor bronze; and the crushing shells are made of the best quality of steel 4½ inches in thickness.

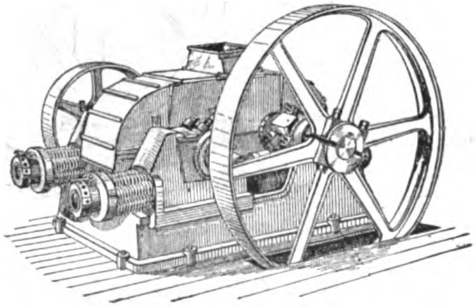

Fig. 3. Crushing Rolls.

The size of rolls ranges from 24" x 15" to 60" x 24", and ranges in weight from 14,000 to 60,000 pounds. Their operative speed ranges from 100 revolutions per minute for the larger, and from 100 to 175 revolutions per minute for the smaller machines.

Fig. 4 shows an Allis-Chalmers steam stamp designed for the reduction of copper ores. This stamp is driven by a vertical steam cylinder with valve gearing arranged to keep the steam-port freely open during the downward stroke, thus adding the power of the steam to the weight of the stamp. The mortar has four discharge screens and rests on a heavy anvil or bed plate, and is held in place by angle guide pieces cast upon the massive framing of iron columns. The upper and lower guides for the stamp-stem are detachable bronze bushings in which the stem is slowly revolved by a horizontal pulley on a sleeve between the upper and lower guide brackets. The sleeve contains two feathers which fit into corresponding slots in the stamp-stem, by which the latter is rotated. The steel

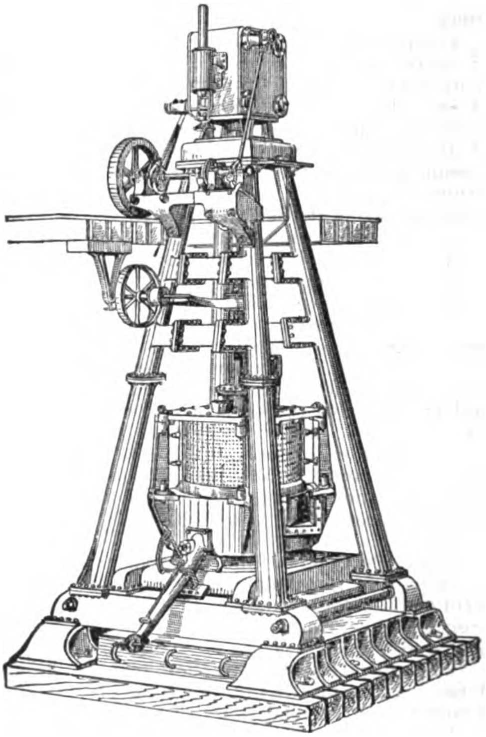

Fig. 4. Allis-Chalmers Steam Stamp.

piston-rod is connected to the stamp-stem by a circular disk which is encased in a cast-iron bonnet bolted to the flange of the stem, the space between being filled with pure gum-rubber packing, so as to relieve the shock on the piston and to permit its removal for repairs without disturbing the stamp. These stamps have a capacity of several hundred tons per day. Other forms used chiefly on copper ores are the Kraus Atmospheric Stamp, and the Tremain Steam Stamp.

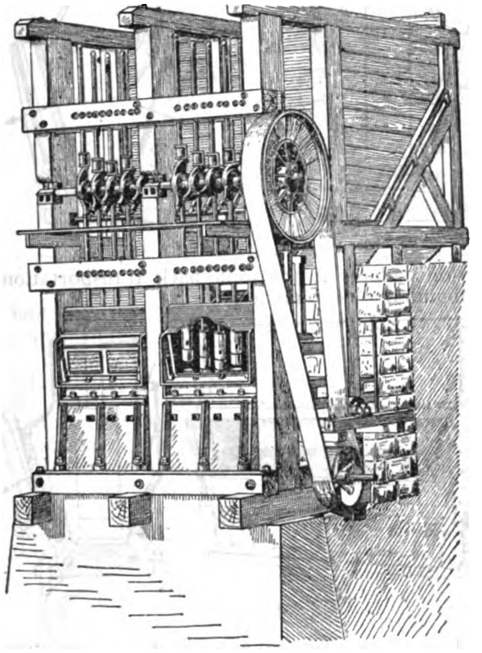

Fig. 5. Ten-Stamp Battery.

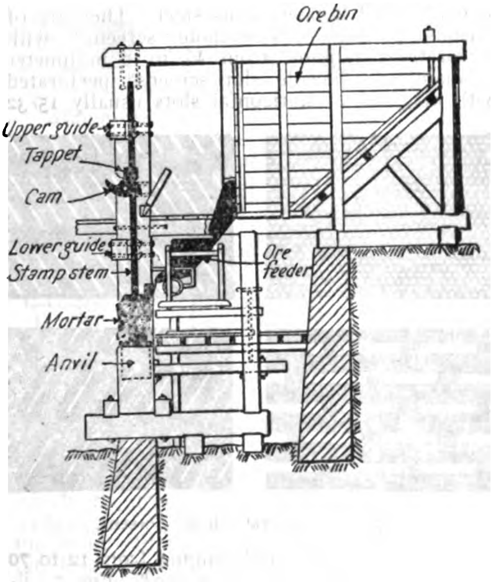

Fig. 6.

Fig. 5 shows the general aspect of a ten-stamp battery operating gravity stamps. The screen and a portion of one of the sectional mortars is removed so as to reveal the stamps and the dies. Fig. 6 shows a sectional view of the same battery, with automatic feeders in place. From the ore bin down to the stamp die within the mortar the various devices and their movable parts, which comprise the battery, are illustrated by the following figures. Fig. 7, ore-bin gate and spout. These are built in sizes ranging from 18 to 24 inches, or in special sizes as may be required. Fig. 8, a «Challenge» ore-feeder. This is an automatic arrangement which may be used with wet or dry ores. Its operation is simple and regular: The cast-iron

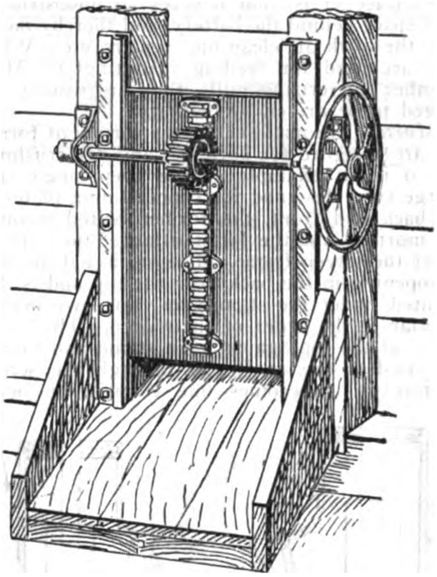

Fig. 7. Ore-bin Gate.

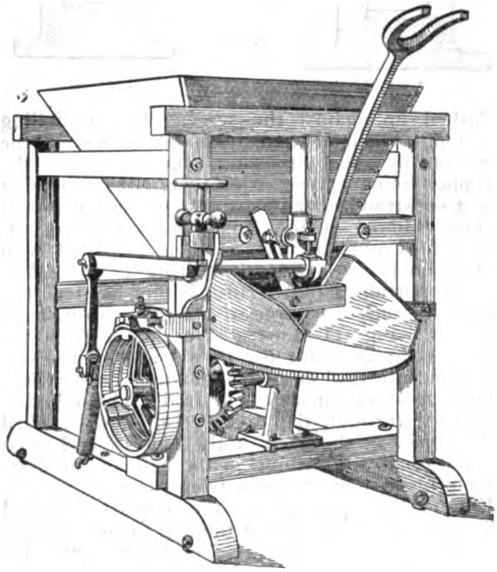

Fig. 8. «Challenge» Ore-feeder.

plate placed at an angle below the hopper is rotated by bevel gears actuated by a friction device in the shape of a tappet-rod or forked lever, which engages a feed collar placed on the central stem of the battery. The entire apparatus is about 4½ feet in height, 3 feet 9 inches in width, and weighs about 845 pounds. Other types of feeders are the «movable suspended,» and the «fixed suspended,» automatic feeders. The principal advantage of using the suspended type of feeder is, that it gives an unobstructed floor space behind the battery, and thereby facilitates the work of «clean up,» repairs, etc. When they are used for feeding «Huntington» Mills or other pulverizing mills, they are usually arranged to be driven by belting.

Mortars are made in a great variety of forms, and are designed for both wet and dry crushing. Fig. 9 is an example of the deep single discharge type, designed for copper lining plates in the back and front, the former bolted through the mortar, and the latter attached to a block under the screen frame. The ore is fed through the opening in the back near the top and is distributed under the stamps by their own action, peculiar to the order of their drop. The water enters at the top against each stamp and carries the crushed ore or «pulp» through the screen as fast as it becomes fine enough, by being dashed up against the screens by the falling stamp. Amalgamation takes place within the mortar by the pulp being splashed up on the copper lining plates. Fig. 10 is an example of a deep straight-back mortar not provided with copper lining plates, amalgamation being affected by outside means. It is provided with steel liners, and a steel wearing plate, and is so proportioned that it affords unusual facilities for the quick discharge of the pulp through the screen. Fig. 11 illustrates a double-discharge mortar designed for use in wet crushing silver, in concentrating or in combination mills where large crushing capacity is desired. The pulp discharged through the back screen flows toward the centre at the back of the mortar, and passing through an opening in the base of the mortar proper, joins the pulp from the front screen. Fig. 12 is an example of the mortars designed for dry crushing. All of them are made double-discharge, with the dies so placed that the dry pulp will easily reach the screens when it is dashed up against them by the action of the stamps. A peculiar feature is the fastening of the die by a dove-tail flange at the bottom. Fig. 13 illustrates a general view and cross-section of a sectional mortar. Its construction in sections adapts it for mule-back transportation in mountainous countries.

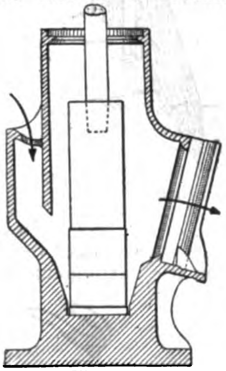
Fig. 9.

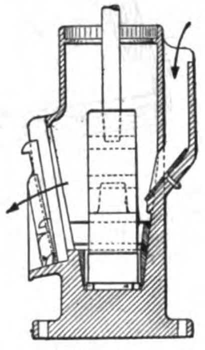
Fig. 10.

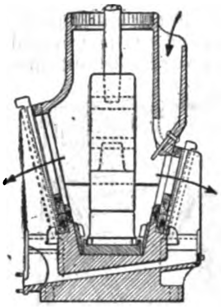
Fig. 11.

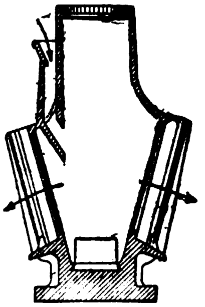
Fig. 12.

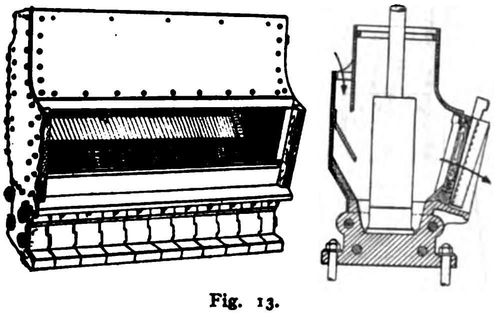
Fig. 13.

It is important to note in this connection that the capacity of a battery of stamps depends very largely upon the construction of the motors used.

Battery or Mortar Screens are usually made of genuine Russia iron, or of the best quality of cold rolled homogeneous steel. They are of various patterns — «roundhole screens» with perforations ranging from ¼ to 1 millimeter in diameter; «needle slot screens» perforated with diagonal or horizontal slots usually 15/32 of an inch in length, and ranging from 12 to 70 mesh; and «indented-slot screens.» Fig. 14 illustrates an example of each type. In addition to these regular patterns, most of the large manufacturers are always prepared to furnish screens punched according to any specifications

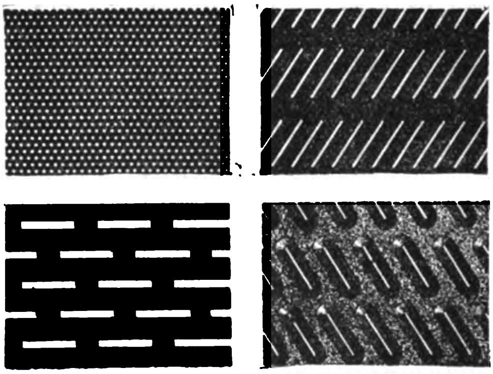
Fig. 14. Perforated-iron Screens.

that may be submitted as may be required for use with particular ores.

Stamp dies are made of very hard and tough material, usually the same as that used for the body of the shoe. Fig. 15 shows six of the principal forms.

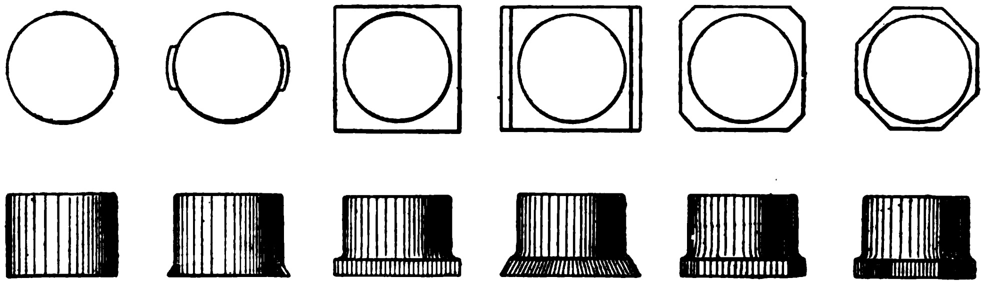
Fig. 15.

Stamp-shoes are made in a variety of regular and special patterns. Fig. 16 shows one of the usual pattern. In wet crushing mills it is attached to the stamp-head by means of strips of wood placed in the space between the neck of the shoe and the socket of the head. The wooden strips are swelled by the water and thus hold the shoe and head firmly together. In dry crushing mills strips of iron are used for this purpose.

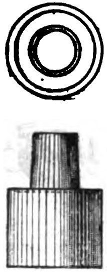
Fig. 16.

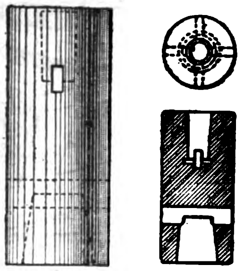
Fig. 17.

Stamp-heads are made the same diameter as the stamp shoes. As shown by Fig. 17, the stamp-head has a tapering socket at each end — the lower for the neck of the shoe, and the upper for the tapering end of the stamp-stem, which requires no other fastening than the wedging action of its taper to bind it firmly to the head. Slots are cut from the outside of the head into the sockets, through which by means of wedges the stem and the shoe can be forced out when necessary.

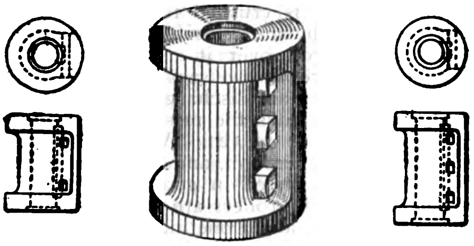
Fig. 18.

The tappets are collars fastened to the stamp-stems. They bear against the revolving cams and thus alternately lift and drop the stamps. Each tappet is fitted with a gib which being pressed against the stem by cross keys behind, binds the tappet on the stem as firmly as possible, and at the same time admits of a quick adjustment to another portion of the stem whenever necessary. As shown by Fig. 18, they are made with either two or three keys, and are counterbored to prevent slipping on the stem.

Cams are being made in a variety of patterns depending upon the height the stem is lifted and dropped, and the necessary distance between the centre of the cam-shaft and the centre of the stamp-stem. They are made both right-handed and left-handed, and are either keyed onto the cam-shaft, or attached by means of taper-bushings which give a self-tightening effect. Fig. 19 shows side and edge views of both types, and the method of applying the taper-bushings.

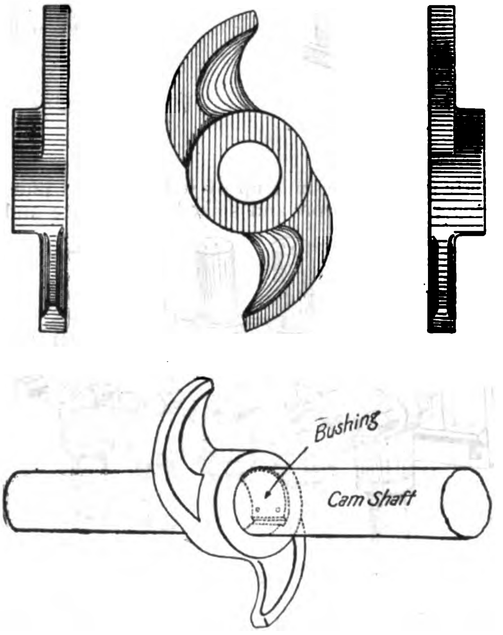

Fig. 19. Cams.

Fig. 20 shows their positions on the cam-shaft so as to give the most general order of a drop for a ten-stamp battery, when driven from either end of the shaft.

The other essential parts of the battery are the «cam-shaft boxes,» «cam-shaft pulley,» and the «stamp guides.» These are illustrated by Figs. 21, 22, 23, respectively. The cam-shaft boxes are made of metal and in the improved forms are provided with an oil drip launder which extends around the two ends and the front of the box and thus prevents the lubricating grease from dripping into the mortar and onto the amalgamating plates. Standard cam-shaft pulleys are built up of well-seasoned pine, properly laid in oil and spiked. The face and sides are turned and thoroughly covered with oil paint. The hub is of cast iron, the through sleeve and one flange being cast in one piece. The sleeve is bored to fit the cam-shaft and turned and key-seated to receive the following flange, the two flanges being bolted together with through bolts.

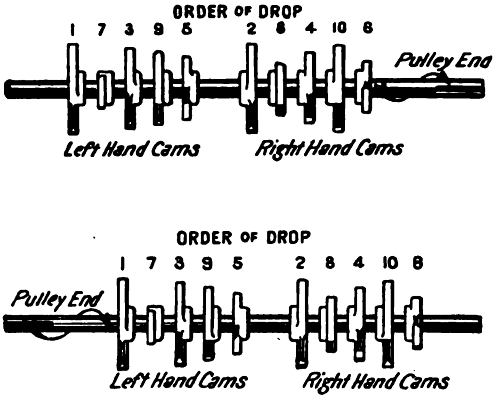

Fig. 20.

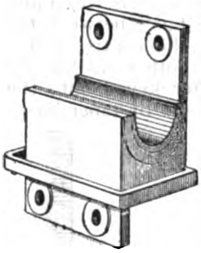

Fig. 21.

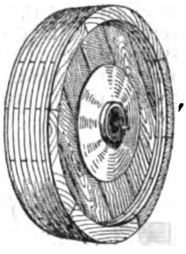

Fig. 22.

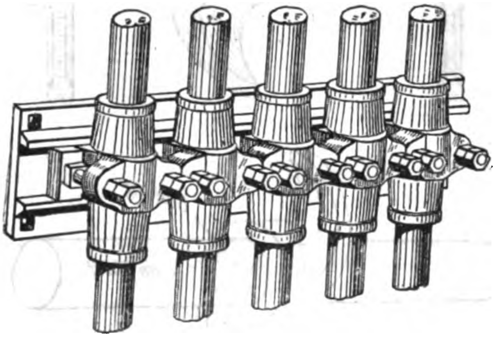

Fig. 23.

The stamp guides are made of wood; wood bushings in iron frames; or entirely of iron. They are made either solid or sectional, the latter form being preferable as a considerable saving in time can be effected by their use, especially when the guides require dressing down.

The stamps range from 840 to 1,200 pounds in weight each, and are usually operated through a mean space of six inches at rates ranging from 105 to 110 drops per minute. Their crushing capacity ranges from 6 to 40 tons for 24 hours according to the milling quality of the ore.

Ball Mills.— These are used for the purpose of reducing ores from lump form down to 30 and 40 mesh. Fig. 24 is an example of the general type.

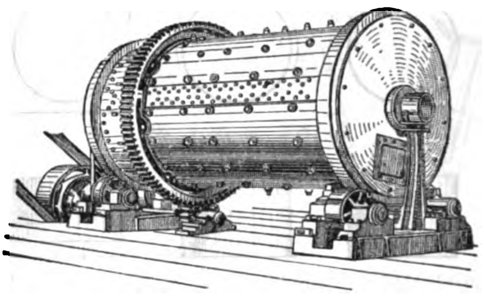

Fig. 24. Ball-mill.

Pulverizers.— Perhaps the best representatives of this class of machines are the "Huntington" and the "Chilian" mills. Fig. 25 shows a general view of a Huntington mill of the latest pattern. In operation, the ore and water fed into the mill through the hopper is thrown by the rotating rollers and scrapers against the ring-die where it is crushed to any degree of fineness desired, by the centrifugal force of the rollers as they roll over it. The water and pulverized ore are thrown against the screens through which they are discharged when ground sufficiently fine to pass the mesh, which ranges in fineness from 60 to 120. Very little slime results from the operation, and the pulp or pulverized ore is delivered in good condition for concentration. The rollers are suspended so as to leave a space of about one inch between them and the bottom of the mill, thus allowing them to pass freely over the quicksilver and the amalgam without grinding it or throwing it from the mill, while at the same time the agitation of the pulp is sufficient to make amalgamation perfect.

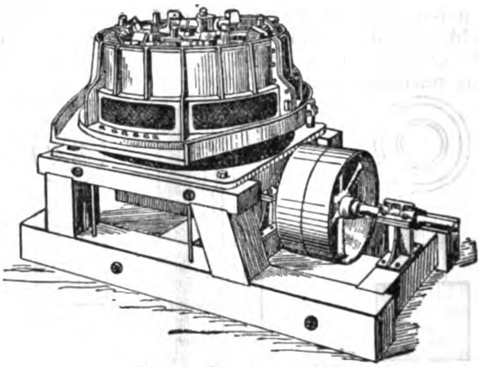

Fig. 25. Huntington Mill.

They are built in sizes ranging from three and a half to six feet in diameter, and from 7,000 to 44,500 pounds in weight. They require from 5 to 15 horse-power to drive them at pulley speeds ranging from 120 to 150 revolutions per minute, to give capacities ranging from 10 to 75 tons of ore for 24 hours.

The principal machinery used in the processes of separation are of the following classes:

Preliminary Washers, which are employed for the purpose of disintegrating and floating off the adhering fine clayey substances from the coarse particles, by the use of running water aided by some form of stirring device.

Sieves and Screens are used for separating the finer from the coarser particles of ore. They are of two classes, (1) «stationary screens,» which include the wire-cloth gravel screens, and the perforated plate screens, and (2) «moving screens,» which include the oscillating bar screens, the plain shaking screens or riddles, and the revolving screens or trommels.

Classifiers are used for obtaining a series of products of diminishing size by means of currents of water.

When the process of separation is accomplished by «hand-picking» methods, the work of separating the valuable ore from the waste material is usually done on «tables,» of which there are at least five classes in general use: (1) Stationary horizontal tables; (2) stationary sloping chutes; (3) shaking tables; (4) belt, rope, or plate conveyors, and (5) revolving circular tables.

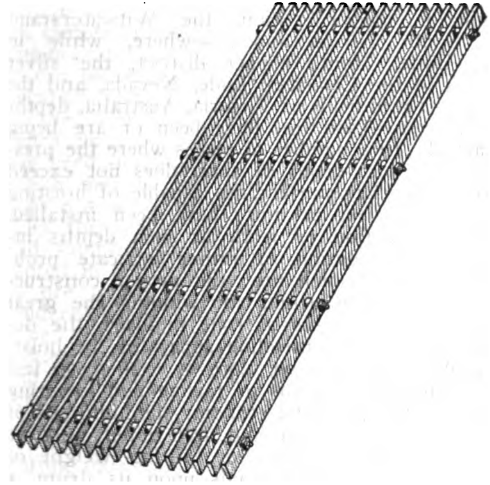

Fig. 26. Ore-grizzly.

Other methods of separation employ «hydraulic jigs,» which perform their work through the alternating upward and downward action of two currents of water upon a bed of sand supported by a screen; «vanners» or endless belts which are shaken rapidly either endwise or sidewise, and have a continuous slow motion up hill; «bumping tables»; «film sizing tables,» and various forms of magnetic separators.

Fig. 26 shows an ore grizzly, which represents the various forms of metal bar screens.

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Mining Engineering, that branch of engineering which pertains to the operations of extracting useful minerals from the deposits in which they occur. While no distinct line can be drawn between the fields occupied by mining and mining engineering, the former may be termed the art and the latter the science of mining. The present article will be confined to a consideration of the qualifications, professional duties and training of the mining engineer; the subjects relating to mining as an art, namely, the modes of searching or prospecting for mineral deposits, the various systems or methods of working mines, and the details of the operations connected therewith, are dealt with under the head of MINING.

The province of the mining engineer comprises the testing and valuing of mineral deposits, the planning and execution of the various mining works required to reach the deposit — such as tunneling, shaft-sinking, etc.— the choice and application of a suitable method of opening the mine and bringing the ore to the surface; and lastly, the installation of the necessary surface and underground plant. In addition, therefore, to a knowledge of the theory and practice of the various kinds and methods of mining, the successful pursuit of the profession demands not only a training in mathematics, mechanics, physics, and other fundamental subjects which underlie all technical education, but also an intimate acquaintance with certain of the natural sciences, particularly geology, mineralogy and chemistry, and many of the principles of civil, mechanical, and electrical engineering. In a well-planned course of professional instruction the scientific studies would preferably come first, but the engineer is incomplete until to these is added a knowledge of the actual practice of mining. The arts of metallurgy, ore-dressing, and milling, moreover, are so related to the art of mining that these subjects also, at least in part, must be included in the equipment of the mining engineer. The functions of the mining engineer cannot be defined in precise terms, largely because of the infinite variety of local conditions which may be encountered, and the differing physical, mineralogical, and chemical characteristics of the ore deposits themselves. (See ORE DEPOSITS.) There has been perhaps a greater tendency toward specialization in mining than in other departments of engineering. As the professional field has broadened, no one man can hope successfully to cover it all. Quite a sharp distinction exists, for example, between metal mining and coal mining. The modes of deposition of coal and of the metalliferous ores, the geological and physical conditions, and the accepted systems of mining, are so different that the engineering of colleries has become largely a specialty. So again among the metals themselves. Engineers may be led to specialize in the direction of iron, or lead and zinc, or copper, or gold and silver mining. This latter differentiation is not the result of anv fundamental diversity in the methods of developing and working the mines, but is due rather to differences in the scale of operation, the physical characteristics of the deposits themselves, the treatment of the ores of the various metals and their final disposition. It frequently happens that the dressing, or concentration, and even the smelting, or other process for the reduction of the ore, are carried on at or near the mine itself, and under the same general management. The mining engineer, therefore, must be something of a metallurgist also, and though not necessarily highly skilled in this direction, he should at least be able to decide upon and select the plant and process appropriate to the character of the ore, and to supervise its erection and operation. But this view applies chiefly to the mining and treatment of the non-ferrous metals. The metallurgy of iron and steel forms far too large a field to be included in the range of work of the mining engineer. It requires a special training, and has itself developed practically into a distinct profession.

Several more or less conventional distinctions are made as to the particular branch of work in which a mining engineer may specialize. He may devote himself to examining, valuing and reporting on mines, being engaged for such work by intending sellers or buyers; he may serve in the capacity of consulting engineer for one or more mining companies; or in doing a general business he may be retained by his clients in an advisory capacity similar to that occupied by a counsellor-at-law, leaving to others the actual execution of the work or the carrying out of the policy determined upon. On the other hand, a mining engineer who becomes identified with the management of the affairs of a particular company must be a successful organizer and business man; he must possess the ability to make favorable contracts for work, the purchase of material and disposal of product, to control men, and not only to plan work but to know how it should be executed to attain the best economic results. He often combines with his purely professional functions the duties of superintendent or manager, and the smaller the property, the greater usually is the variety of responsibility devolving upon the engineer. When in charge of a small or temporarily non-paying mine, especially one situated in a remote region, the engineer may be compelled to serve simultaneously in the capacities of superintendent, foreman, assayer and bookkeeper. He must know enough of chemistry and of civil, mechanical and electrical engineering, to exercise intelligent control in matters relating to these branches, and he should have at least a general knowledge of mining law.

Formerly, the profession of mining engineering was less complex and exacting in its requirements than at the present time. The great advances made during the past 35 years in scientific and technical lines have brought with them constantly increasing responsibilities. An inspection of the course of study prescribed in mining schools of good standing will show how largely the education of a student in mining engineering lies in the direction of subjects not relating specifically to the art of mining itself. Manual labor has been more and more replaced by mechanical appliances, and the engineer must keep abreast of the times by alertness in availing himself of the innovations which have been introduced in endless variety: the ever widening applications of electricity and compressed air for the transmission of power, the numerous improvements in the machines and processes for the concentration and reduction of ores, the increase in knowledge of the relations of geology to the deposition of ores; all these constitute new tools in the hands of the mining engineer, but they unite also in demanding a broader and more severe training. Up to 1870 applications of electricity and compressed air to mining were practically unknown; now they are employed in nearly all departments of mine work. Compressed air rock drills are used everywhere for both surface and underground excavation of rock; electric drills are rapidly gaining in favor; electric and compressed air locomotives or rope haulage have largely superseded hand tramming and haulage by mules and horses, wherever the quantity of material dealt with is sufficient to warrant the additional first cost of plant; the greatly increased depths at which mining is carried on in many districts have made necessary the design and erection of enormously powerful and complicated hoisting engines; and finally, the successful and economical operation of such plants requires the maintenance of well equipped machine and other repair shops.

The question of hoisting large quantities of ore from great depths, that is, vertical depths of say more than 5,000 feet, is one of the most serious mechanical problems at present confronting the mining engineer. Depths of approximately 5,000 feet have been already attained in several mining districts, notably in the Lake Superior copper region, the Witwatersrand in South Africa and elsewhere, while in the Butte, Mont., copper district, the silver mines of the Comstock Lode, Nevada, and the Bendigo gold fields of Victoria, Australia, depths of 3,000 to 3,500 feet have been or are being reached. In a number of places where the present maximum depth of shaft does not exceed 3,000 feet, elaborate engines capable of hoisting from 5,000 feet or more have been installed. The prosecution of work at such depths involves the solution of rather intricate problems, among which are: the proper construction of hoisting drums for winding the great lengths and weights of rope required, the design of reliable controlling apparatus for hoisting at speeds of 3,000, 4,000 or even 5,000 feet per minute, the means of raising and lowering with safety, speed and economy the hundreds of men required in large and deep mines, and the difficulties involved in the varying weight of the rope itself, as it winds upon its drum, a weight which often greatly exceeds that of the ore raised at each hoisting operation. A high degree of mechanical skill and knowledge is demanded for the effective solution of these and other problems, some of which have only recently presented themselves (*vide* the discussions on «Hoisting from Great Depths,» which have appeared during 1902 and 1903 in the 'Transactions of the Institution of Mining and Metallurgy,' London, the South African Association of Engineers, and the 'Engineering and Mining Journal,' New York).

In all branches of his work the mining engineer of the present day finds himself compelled to introduce every new method and appliance that promises some saving in the cost of production. This is the direct result, not only of competition, but of the great reduction in market price of nearly all of the metals within the past three decades. In 1873 the price of silver was $1.30 per ounce; now it is 58c; copper was then worth 30c per pound, now 13c; lead was then 6½c per pound, now 4¼c, and other similar examples of the decline in value of the staple metals can be cited. Furthermore, as the more easily accessible mineral deposits are exhausted, the mining engineer is called on to practise his profession farther afield, often in regions remote from centres of population. Here he may be confronted with new problems arising from the lack of transport facilities, distance from source of supplies and materials, labor insufficient in quantity and poor in quality, and adverse and unhealthful climatic conditions.

That function of the mining engineer which relates to examining and reporting on mining properties is both delicate and difficult, and calls for the highest degree of professional efficiency. In brief, the examination of a mine includes a study of the local conditions, topographical, geological and economic, and of the mineral deposit itself; the mineralogical character, quality, quantity and grade of the ore and its value per ton; an estimate of the cost per ton of mining the ore and the net profit which reasonably may be expected; and lastly, the probable life of the mine. Upon these factors depends the market value of the property. In determining the quantity and grade of the ore, the deposit, as revealed by the development work already done, must be carefully and systematically, tested. This is done by taking a series of samples in a manner which will enable the engineer to obtain a true average of such ore as can be examined and measured with sufficient accuracy and definiteness to warrant confidence in the results obtained. Evidently much depends upon how and to what extent the mine has been developed. The variety of conditions which may be met is almost infinite. Nature does not work with rule and plumb-line. Besides the ore which can be actually measured and sampled, the engineer may often be warranted in taking into consideration the quantity of ore which in the future will probably be rendered available by further development of the mine. In balancing such probabilities or possibilities, he must be guided mainly by geological and mineralogical analogies deduced from his previously acquired knowledge and experience. Lengthy discussions bearing upon this subject, by well-known engineers, have been published during 1902 and 1903, under the title of 'Ore in Sight,' in the 'Transactions of the Institution of Mining and Metallurgy,' the 'Engineering and Mining Journal' and the 'Mining Reporter.' It may be added that the circumstances under which mine examinations are made are often rendered difficult and embarrassing where the perpetration of fraudulent practices by interested persons may be attempted, for the purpose of misrepresenting or concealing the true condition of the mine; records of cost and of the value and amount of previous production may be falsified, or the samples taken by the engineer tampered with. Constant vigilance is required to guard against such contingencies.

With the development of the mining industry and the wider adoption of mechanical appliances and engineering methods in connection with mining operations, the demand for trained engineers has steadily increased until, at the present time, probably no field of engineering affords better opportunities for a young man. It is true that the course of preparatory study is exacting and the life somewhat arduous, but as yet it is one of the few professions which cannot be said to be over-crowded. Formerly, the so-called "practical" man monopolized most of the positions of responsibility and emolument, but the educated engineer has made his way to a degree that has produced an active demand for his services. Mining companies have found that the greater breadth of view resulting from a sound technical education has a direct money value. The trained engineer is acquainted with what is being done in his profession in other regions or countries. He keeps himself informed as to the experiments and discoveries made by others; is quick to utilize improved and more economical methods, and knows not only what to do but also what to avoid. His competitor who lacks this knowledge, and who has at his command only what has come within his own personal experience, is in danger of failure, if circumstances bring him face to face with new conditions, and with problems the prompt and efficient solution of which must be based on a familiarity with the principles of engineering practice. It must be remembered that the young graduate of a mining school is not yet an engineer; he has been grounded in the fundamentals of his profession, has absorbed a multitude of facts relating to its practice, and his powers of observation have been cultivated; but before he is fitted to deal successfully with the diverse problems which sooner or later will confront him, he must in most cases patiently continue his education in the field for some years after graduation. His first employment is likely to be that of chemist, assayer, draughtsman, surveyor or assistant to one of the heads of department in the mine or works. How fast he advances will depend on his native energy and ability and the efficiency of his preparatory training. Not all young men are fitted by nature to become successful mining engineers. If the student has no aptitude for such a pursuit, the sooner he finds it out, the better, both for himself and his instructors. Unquestionably, an immense amount of time, money and energy are wasted in the attempt to give a scientific and technical education to young men whose bent — if they possess any decided bent — is in some other direction. The curriculum of the school, therefore, should be so planned as to eliminate inefficient students as early in the course as possible.

In the making of an engineer, circumstances and opportunity are important. A well-known engineer and instructor has said: "A man without school education may make a remarkable engineer; but it may have taken him years to get his training and at the end of the time there may be whole regions of knowledge utterly unknown to him; in other words, he is liable to be a one-sided man without a broad outlook upon other fields than his own. The school cannot teach him everything, but it can give him the keys to the storehouses which he may need to draw from in after life." A graduate of a good mining school has this advantage over his uneducated competitor: that he is better able to avail himself of the opportunities presented to him.

Mining Schools.— The need of technical schools specially equipped for preparing young men for the profession of mining engineering was long ago recognized in Europe, and some of the institutions there established have exerted through their graduates a marked and beneficial influence upon the mining industry of the world. The best known of the European mining academies are those at Freiberg (Saxony), Clausthal, Aix-la-Chapelle and Berlin (Prussia), Leoben and Przibram (Austria), Paris and St. Etienne (France), and London (England). In addition to these, separate schools for mine foremen are maintained at Freiberg, Clausthal, Aix-la-Chapelle, St. Etienne, Przibram and elsewhere. Previous to 1865, mining practice in the United States was based chiefly upon European methods, and the earliest work prosecuted on a large scale in this country — for example, at the Comstock mines, Nevada — was in great measure planned and managed by American engineers who had received their education in Europe. The influence of the Continental institutions also made itself felt in the organization of the older American mining schools. The first School of Mines in the United States was founded in 1863 under the auspices of Columbia College, New York. Since then, mining schools have been established in many parts of the country, the total number being now about 30. The majority of them, however, are small, with limited equipments and teaching forces. Many exist simply as departments of technical schools connected with State universities. A few are separate and distinct institutions. The leading mining schools of the United States are: the School of Mines of Columbia University, the Mining Department of the Massachusetts Institute of Technology, the College of Mining of the University of California, the State School of Mines of Colorado, the Michigan College of Mines, the School of Mines of the University of Minnesota and the schools at Lehigh University and Lafayette College. The courses of study leading to the degree of mining engineer occupy four years, but exhibit quite wide variations in plan and scope. Some of the best of the schools have rigidly prescribed courses; others offer a range of elective subjects, comprised in more or less interdependent groups. Without attempting a comparison of the curricula of these schools, a condensed statement of the ground covered by one of the leading institutions may here be given:

First Year.— Algebra — general theory of equations (elementary algebra required for admission), analytical geometry, spherical trigonometry (plane trigonometry required for admission), general inorganic chemistry, qualitative analysis, physics, descriptive and determinative mineralogy, including crystallography and blow-piping, theory of surveying and mechanical draughting. In the vacation following the first year, five weeks' field practice in surveying.

Second Year.—Calculus, elementary and analytical mechanics, physics, industrial chemistry, theory of railroad surveying, general geology, elements of electrical engineering, quantitative analysis, descriptive geometry and drawing. In the vacation following, five weeks' field work in general surveying and four weeks' railroad surveying.

Third Year.— Analytical mechanics, economic geology, properties and resistance of structural materials, masonry and timber construction, engineering of power plants, earth and rock excavation, railroad and mine tunnels, boring and shaft-sinking, exploration, development and methods of working mines, general metallurgy, and metallurgy of the non-ferrous metals, graphic statics, assaying, principles of electrical engineering, experimental mechanical engineering, optical mineralogy and petrography. Vacation work: five weeks' systematic study in mines selected for the purpose, one week's study in metallurgical works and one week of field geology.

Fourth Year.— Thermodynamics, steam engines and boilers, heat and its applications, motors other than steam, hydraulics, ore-dressing, mine engineering, mine plant and equipment, mine surveying, mine administration, metallurgy of silver, gold, iron and steel, draughting and design of mine plant, geological examinations and surveys, thesis or project in mining. Laboratory work is required in connection with geology, mineralogy, physics, qualitative and quantitative analysis, assaying, testing of materials, electrical engineering, metallurgy and ore-dressing.

Admission.— The requirements for admission to the best American mining schools comprise: Elementary and certain portions of advanced mathematics, elementary chemistry and physics, free-hand drawing, English, elementary history, elementary German and either elementary French, Latin or Spanish. Under certain circumstances, students may be admitted on certificate of other institutions.

Partial Bibliography.— Beard, ‘The Ventilation of Mines’ (1894); Bowie, ‘A Practical Treatise on Hydraulic Mining in California’ (1898); Charleton, ‘Report Book for Mining Engineers’ (1895); Curle, ‘The Gold Mines of the World’ (1902); Denny, ‘Deep Level Mines of the Rand’ (1902); Foster, ‘Text-Book of Ore and Stone Mining’ (1901); Greenwell, ‘Mine Engineering’ (1889); Hatch, ‘Gold Mines of the Rand’ (1895); Hughes, ‘A Text Book of Coal Mining’ (1901); Ihlseng, ‘A Manual of Mining’ (1899); Lock, ‘Practical Gold Mining’ (1889); Lupton, ‘Mining; an Elementary Treatise’ (1893); Pamely, ‘The Colliery Manager's Handbook’ (1898); Percy, ‘Mechanical Engineering of Collieries’ (1892); Stretch, ‘Prospecting, Locating and Valuing Mines’ (1903); Williams, ‘The Diamond Mines of South Africa’ (1902); Wilson, ‘Mine Ventilation’ (1884). Also consult the ‘Transactions’ of the following societies: American Institute of Mining Engineers, New York; Institution of Mining and Metallurgy, London; Institution of Mining Engineers, Newcastle-upon-Tyne, England.

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Mining Law. *Historical.*—This subject may be divided into two classes: (1) As applied to mines found in ordinary real estate, under private ownership; (2) As applied to mines found in the public domain of the United States. The first class needs no especial reference, as it is a part of the general law of real estate and personal property. The second class is *sui generis*, and arose out of the customs of miners and their rules and regulations, which obtained and were established at an early date in California. Soon after the discovery of gold in California in 1848, thousands of persons proceeded to this new El Dorado, impressed with the belief that there was gold sufficient to satisfy the desires of all, which was to be had for the mere mining of it. California had lately become the property of the United States by concession from Mexico, through the treaty of Guadalupe Hidalgo (q.v.). No distinctive government existed, but the territory thus acquired was under the military authority of the United States. Those who came within its borders in pursuit of gold soon found that the common law with all its elasticity could not be made applicable to the various conditions which presented themselves, because the like was never known. There was no legislative body in existence to enact laws applicable to these new conditions, and no organized courts to enforce rights and grant effective remedies. These conditions presenting themselves, there grew up at an early period certain peculiar usages and customs applicable to this new industry. Miners organized mining districts and promulgated written rules and regulations based upon these customs and usages for their guidance in the acquirement of mining rights and for the protection of their lives, liberty, and property. A method was thus provided, whereby rights to mine were initiated, and protected, and all rights of liberty and property recognized. These customs, rules, and regulations were recognized by the courts, and adopted by the legislature of California, after the organization of a local political government and afterward by the United States in the enactment of the mining statutes. For 18 years after the treaty above mentioned had been executed, Congress remained inert and enacted no law recognizing the rights of miners to work the mines or in any wise providing for their disposal. The first recognition of the rights of miners by Congress was in the passage of the Act of 27 Feb. 1865, wherein were recognized their possessory rights. On 4 July 1866, Congress reserved all lands valuable for minerals from sale, except as otherwise expressly directed by law; and on 26 July 1866, Congress enacted the first law providing for the location and patenting of quartz claims. This was followed by the Act of 9 July 1870, providing for the location and patenting of placer claims, and on to May 1872, the Acts of 1866 and 1870 were amended and revised, and this latter act with subsequent amendments is now the Mineral Act in force.

Classes of Mines.—Mines upon the public domain are of two kinds, viz.: (1) Quartz mines; (2) Placer mines. A quartz mine is one which embraces ground in which exists a vein, lead, lode or ledge in place, carrying gold, silver, copper, cinnabar, tin or lead, or other valuable deposits in its rock or earth. A placer mine, in the broadest sense, and as it now is understood, embraces ground in which exist valuable deposits of mineral or mineral substance not in place.

Definitions.—A mining claim is a parcel of land containing precious metals in its soil or rock. A vein is a body of mineral or mineral bearing rock or earth within defined boundaries in the general mass of the earth. A vein is in place when it is held or enclosed in the general mass of the fixed and immovable rock. The end-lines of a quartz claim are those which cross the vein upon which the location is based, on its course or strike. Side-lines are those which run parallel with the course of such vein.

Location.—Rights to mines upon the public domain are initiated by location, the several steps of which, as provided by the acts of Congress, are: First, the discovery of one or more of the minerals or deposits mentioned in the acts of Congress upon the unappropriated public domain, and within the limits of the claim sought to be located. Second, distinctly marking the claim on the ground so that its boundaries may be readily traced. Third, if the State or territorial statute, or local rules and regulations require it, the making a record of the claim which must contain the name, or names, of the locators, the date of the location, and such a description of the claim located, by reference to some natural object or permanent monument, as will identify the claim. In most of the mining States and Territories, statutes have been enacted requiring the performance of these various steps in a more definite and special manner, and providing for the performance of other acts all within certain times, and such statutes have been held valid and constitutional by the supreme court of the United States.

By Whom.—Under the acts of Congress no one is entitled to locate a mining claim unless he is a citizen of the United States, or has declared his intention to become such, but practically an alien may locate a mining claim and hold and transfer the same against all the world, except the government, and even as against it, unless it institute proceedings against him on account of such alienage. But an alien cannot patent a mining claim.

Extent of Location.—Only unappropriated public mineral land is open to location, and some surface ground must be appropriated with all locations. A placer claim of 20 acres or less may be located by one person, and an association of eight or more persons may locate 160 acres, and it may be in any form or shape. A quartz claim or mine may be located 1500 feet along a vein, lead, lode or ledge, and 300 feet on each side thereof. It also may be of any form or shape, depending upon the extent of unappropriated mineral land which is sought to be appropriated, but cannot exceed 1500 feet in length and 600 feet in width.

What Located as Placer.—The land department of the United States has held that the following substances, other than those of a metallic character (but classified as mineral), when occurring in the form of deposits not in place, may be located as placer claims: Alum, asphalt, borax, diamonds, precious stones, gypsum, kaolin, marble, mica, soda carbonate and nitrate, slate for roofing purposes, and umber. The acts of Congress have provided for the location of building stone and petroleum as placer claims.

Representation.—In order that the right of possession, acquired by the valid location of mining claims, be continued, there must be placed upon each claim $100 worth of labor or improvements each year after the year in which the location is made, until patent is issued therefor. Discovery and appropriation are the source of title, and working and development the condition of continued ownership of a mining claim. One need never obtain a patent to a mining claim if he perform his annual representation work, and he may hold it against the world. Patents, if desirable, may be obtained by following the provisions of the acts of Congress.

Abandonment and Forfeiture.—Rights and titles to mining claims may be lost either by abandonment or by forfeiture. Abandonment consists of leaving the claim without intention of returning thereto, and not caring what becomes of it. Forfeiture consists of the failure to perform the annual representation upon the claim, and its location by some third person.

Extralateral Rights.—The most remarkable departure from the common law of real estate and mines, is that with reference to extralateral rights. This is only applicable to quartz claims or mines. The acts of Congress give to the locator of a quartz mining claim all veins to their uttermost depths, which have their tops or apices within the surface boundaries of the claim, although in their descent into the earth they so far depart from the perpendicular as to extend outside the vertical side-lines of such surface location. These rights are bounded and limited by vertical planes drawn downward through the end-lines of the surface location, and so continued in their own direction that they intersect such exterior parts of the vein. This right applies to all veins which have their tops or apices within the surface boundaries of the location extended downward vertically. The vein upon which the location is based is designated as the original or discovery vein, and the other veins having their tops or apices within the surface boundaries of the location, are designated as collateral, secondary or incidental veins. In order that extralateral rights attach to the incidental, secondary or collateral veins, the location must be so made on the ground as to give the owner thereof extralateral rights to the original or discovery vein. Whether extralateral rights attach or not, depends on the surface form of the location, as, for instance, the end-lines must be substantially parallel to give any extralateral rights. But speaking generally, the owner of a quartz mining claim has the right to follow all veins in their descent into the earth to their uttermost depth, to the extent that the tops or apices of such veins are within the surface boundaries of his location. If, however, through mistake, inadvertence or want of knowledge, the location is made so that the vein, upon which the location is based, on its course or strike, passes through both side-lines of the location instead of the end-lines thereof, such side-lines as located become the end-lines of the claim for the purpose of bounding extralateral rights. Extralateral rights are confined to the vein itself, and no right is given to go outside the vein. The strike or course of a vein is its length, running with the surface of the earth. The dip of a vein is its departure from the perpendicular on its descent into the earth.

Uniting Veins.—Veins which unite on their dip are owned severally by the owners of the location within the surface boundaries of which their respective tops or apices are found, down to the point of intersection, whereupon the point of intersection and the entire vein beyond that point, belongs to the older claim, which has the apex or top of one such vein within its surface boundaries.

Tunnel Claims.—The Acts of Congress also provide that where a tunnel is run for the development of a vein or lode. or for the discovery of mines, the owner of such tunnel shall have the right of possession of all veins or lodes within 3000 feet from the face of such tunnel on the line thereof, not previously known to exist, discovered in such tunnel, to the same extent as if discovered from the surface; and locations on the line of such tunnel, of veins or lodes not appearing on the surface, made by other parties after the commencement of the tunnel, and while the same is being prosecuted with reasonable diligence, shall be invalid. No patent to a vein discovered in the course of a tunnel can be procured under the statute. No surface location of such vein need be made; but the location notice may be placed at the mouth of the tunnel. The discoverer of a vein in the course of a tunnel is entitled to 1500 feet of the vein, or any part thereof, on either side of the line of his tunnel. A tunnel site located upon the public domain may be 3,000 feet in length, and if the ground on each side of the line of the tunnel is vacant and unappropriated, the owner of the tunnel site is entitled to all blind veins not theretofore appropriated which are encountered in the course of his tunnel to the extent of 1500 feet, any part of which may be claimed on either side of the line of such tunnel.

Coal Land.—While coal is designated by the acts of Congress as a mineral, the lands containing it are not acquired under the Mineral Act. but under a special statute, and are entered and patented by governmental subdivision. See MINES AND MINING.

Bibliography.—For an exposition of the early mining laws of California, consult Yale on 'Water and Mining Rights.' For a full treatment of mining law as to mines on the public domain, consult Lindley on 'Mines,' Adams and Barringer on 'Mines,' Snyder on 'Mines,' and Clark's 'Mineral Digest.'

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Mining Engineers, American Institute of, an organization founded in 1871 to promote the arts and sciences connected with the economical production of the useful minerals and metals, and the welfare of those employed in these industries, by means of meetings for social intercourse and the reading and discussion of professional papers, and to circulate, by means of publications among its members and associates, the information thus obtained. Membership 3,500.

Mining Industry, American. See AMERICAN MINES; MINES AND MINING; MINING AND MILLING MACHINERY; MINES AND MINING, LAW OF; MINING ENGINEERING; MINES, DRAINAGE OF; MINING LAW; QUARRYING; COAL MINING; GOLD MINING, ETC.

Min'ister, a high officer of state entrusted with the administration of national affairs. Collectively, the persons who constitute the administration are called in Europe the ministry, and also the cabinet. The cabinet of the President of the United States consists of the secretaries of state, treasury, war, navy, the interior, commerce and labor and of the attorney-general and postmaster-general. These ministers hold office at the pleasure of the President, by whom they are appointed subject to the consent of the senate. While in office they cannot hold seats in Congress. The term minister is seldom applied in the United States to members of the cabinet, but is used, as in Europe, to designate diplomatic officers. (See DIPLOMACY.) In Great Britain, of late years, the ministry has been formed by some eminent party leader who has the confidence of the House of Commons, and is authorized by the sovereign to organize a cabinet. The person thus charged with the task selects from his party or from those favorable to his policy the members of the ministry, taking himself generally the post of premier or prime minister, and commonly the office of first lord of the treasury. The other principal ministers are the lord chancellor, the three secretaries of state for home, colonial, and foreign affairs, the secretary at war, and the chancellor of the exchequer. The executive government of France is divided into 10 departments or "ministries," namely, of state, justice, foreign affairs, interior, finances, war, marine, public instruction and worship, agriculture, commerce, and public works, and Algeria and the colonies. See CABINET.

Minister's Wooing, The, a novel by Harriet Beecher Stowe, first published in serial form in the 'Atlantic Monthly' in 1859. The scene is laid in New England, and deals with the habits and traditions of the close of the 18th century. The "minister" in the tale is the famous Samuel Hopkins 1721–1803, the founder of "Hopkinsianism." The central purpose in this story is to show the sternness and inflexibility of the New England conscience, which clings to the Calvinistic doctrines through all phases of life. The struggle that goes on in the heart of the heroine and her mother when the brother and son, James, is supposed to be drowned unconverted, is a graphic delineation of the moral point of view at that time.

Min'ium. See LEAD.

Min'iver, the Siberian squirrel, which has fine white fur; also the fur itself.

Mink, a circumpolar species of weasel (family *Mustelidæ*), valuable as a fur-bearer, known in North America as *Putorius vison,* and in the Old World as *P. lutreola,* although substantially the same animal. The mink is a true weasel, with 34 teeth, and not a marten with 38; but it is of larger size, being about two feet long, one fourth of which belongs to the tail, and has a stouter form and bushier tail, more like the martens. Males are much larger than females. The mink differs greatly from both weasels and martens, and in those points in which it is modified toward this mode of life, namely, the half-webbing of the toes, short ears, and close-set, bristly, glistening pelage, it makes an approach toward the others. In color, the mink ranges from dull yellowish-brown to a rich blackish chocolate-brown. The ordinary color is a dark reddish-brown, growing blackish on the tail, and marked by a white patch on the chin of variable extent. The pelage consists of a dense, soft, matted, under-fur, mixed with long, stiff, lustrous hairs on all parts of the body and tail. The gloss is greatest on the upper parts; on the tail the bristly hairs predominate. Northern specimens have the finest and most glistening pelage; but the rough treatment given its coat by the animal in scrambling through holes and crevices in rocks, rotten logs and broken ice, so rapidly damages its fur that only the pelts taken in early winter show the fur to perfection and yield full value to the trapper. Both sexes are extremely odorous, due to the secretion, equally in both sexes, of a fetid musky scent in small perineal sacs opening near the orifice of the rectum, on each side; the smell is powerful, penetrating and lasting, and is under voluntary control of the animal, but it cannot be discharged like that of the skunk, and is by no means so overpowering. The purpose of this secretion is undoubtedly the attraction of the sexes; and it is used to advantage by trappers as a scent-bait for their traps.

Minks occur in all parts of North America, and are so prolific, so well-supplied with food and so secretive, that they survive numerously even in the more thickly settled parts of the country. They abound near the coast and in the neighborhood of the larger lakes, rivers, and marshes, but are to be found along almost every stream, even in the driest portions of the interior. The minks cling to the water-courses where they find plentiful food in the form of meadow-mice, frogs, mussels, fishes (especially eels) and insects. In New England, at least, they feed largely on earthworms, getting them in plenty even in midwinter; and when very hungry, or a good opportunity offers, do not hesitate to attack larger animals, as muskrats — which they are able to pursue through underwater ways into their houses,— rabbits, partridges, ducks, and poultry. They search the stream-banks for prey, diving and swimming long distances with ease, go about under loose ice and snow, climb rough-barked trees, and penetrate crevices and hollows almost with the ease of a serpent, so that nothing is safe from their inquisitive ferocity; and in winter they wander widely.

Their own homes are made in burrows, usually, but not always, opening in the bank of a stream; and are more often accidental than carefully contrived. In some such retreat the female brings forth in early spring her litter of four or five young, which she guards with great care and courage from all enemies, including the males of her own species. The kittens, and the older ones, indeed, exhibit the same playfulness in and out of the water which characterizes otters.

No fur-bearing animal is so unsuspicious of traps and so easily caught as the minks, and they are the victims of boys and amateurs as well as of professional trappers in all parts of the country. The value of the pelts varies with their color, condition, size and the varying demand of changing fashion, but good ones are always of sufficient worth to make them reward the trouble of taking. When captured young they are easily habituated to confinement in suitable pens, and are tamable to a certain degree. They will breed in captivity, and several temporarily successful attempts have been made to rear them in large numbers for the sake of their pelts. They are fed upon fish, coarse meat, etc. The sexes are kept separate except during the month of March, and reproduction begins when the female is one year old. Tame minks make excellent ratters, doing the duty of ferrets.

Consult: Audubon and Bachman, 'North American Quadrupeds' (1851); Coues, 'Fur-bearing Animals' (1877); Cram, 'Little Beasts of Field and Wood' (1899); Stone and Cram, 'American Animals' (1902).

Minneapolis, mĭn-ẹ-ăp'ō-lĭs, the largest city in Minnesota (q.v.), is located at Saint Anthony Falls (q.v.) on the Mississippi, 2,200 miles from its mouth. The name is derived from the Indian word *minne,* meaning water, and the Greek word *polis,* city. Minneapolis is situated on both sides of the Mississippi River, and covers an area of 53 square miles. The two parts of the city are connected by 17 bridges, nine of which are highway bridges, and eight railroad bridges. To the great water-power at Saint Anthony Falls are to be attributed in large degree the founding of the city and its remarkable subsequent growth and development.

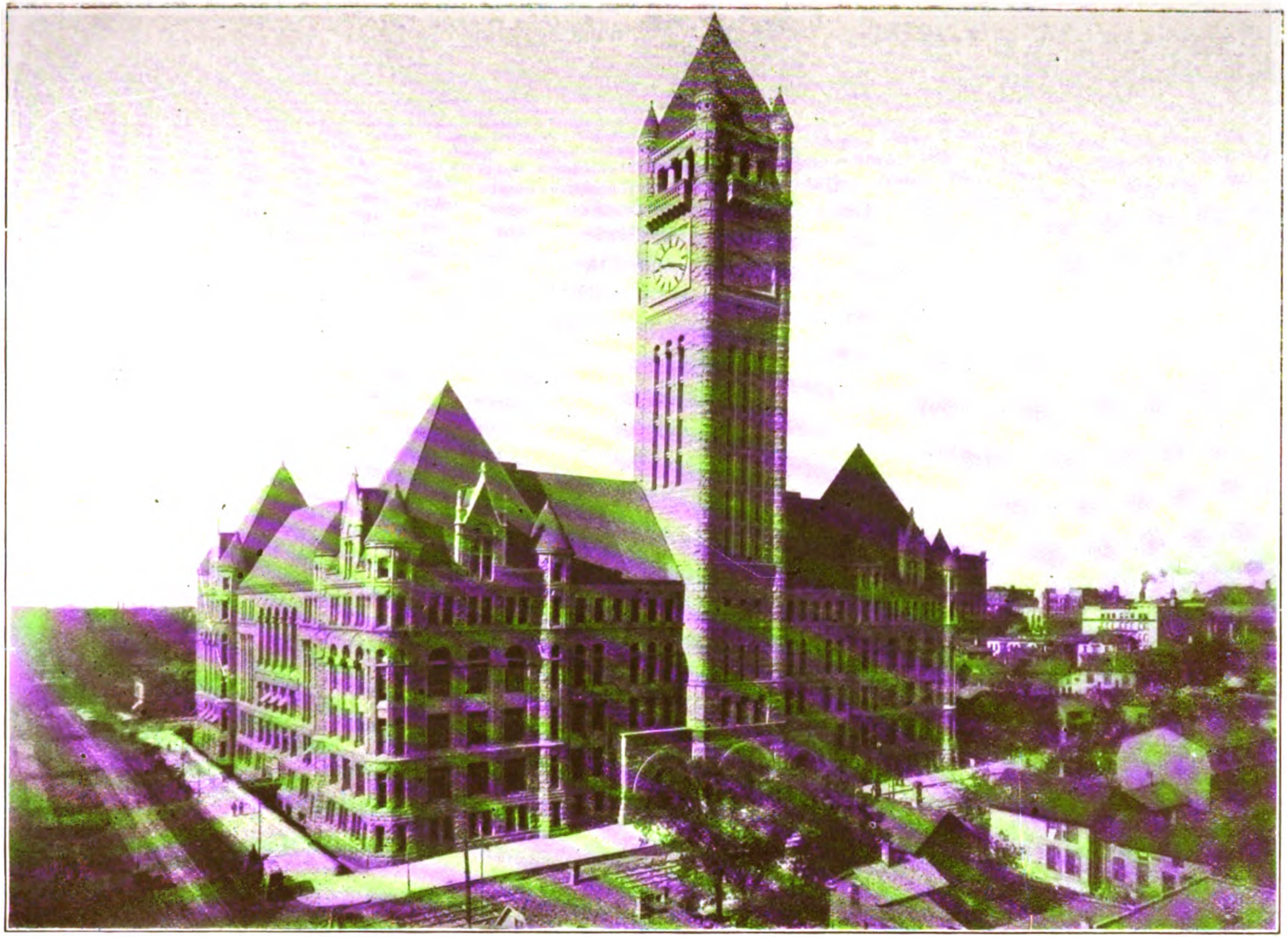
Commerce and Industries.— The rapid increase in population is due to its unrivaled facilities for manufacturing and distributing, and to its location at the gateway of the rich agricultural region of the Northwest, whose population is largely supplied by its manufacturing and commercial interests. The increasing growth and importance of this territory adds yearly to the resources of Minneapolis, and has already made it the chief manufacturing and commercial city of the Northwest. Minneapolis is the largest primary wheat market in the world, and its flour milling (q.v.) industry exceeds that of any other city. Its mills have a capacity of 80,000 barrels daily, and the product is sent to all parts of the world. There were exported to foreign countries in a single year 3,400,000 barrels, while over 16,200,000 were sold in this country. The elevator interests are also great. These, together with the flour mills, furnish employment to many thousands of men. The manufacture of breakfast foods has already become a large industry and is constantly gaining in importance. It was in the manufacture of lumber that the water-power at Saint Anthony Falls was first utilized, and from that beginning Minneapolis has become the largest lumber (q.v.) centre in the United States. The capacity of its lumber mills is about 3,500,000 feet a day, and it is estimated that not less than 10,000 men are employed in all departments of the work. Not only is a large part of this lumber manufactured in Minneapolis, but such are the distributing advantages of the city that much material manufactured in other parts of the West is shipped here for sale and distribution to other points. The proximity of the city to a great and rich agricultural district has made it a favorable point for the distribution of agricultural implements, and in its jobbing trade, in this department, it hold the second place in the world. It is also the centre of an increasing manufacturing industry in agricultural implements, and as the large area of unoccupied land in the Northwest is settled, it is evident that this industry alone will reach vast proportions. The yearly value of the manufactured product in this line already exceeds $6,000,000. The woolen mills of Minneapolis are well known. Their output is considerable and the quality of their product is excellent. The manufacture of boots and shoes is also an important and growing industry, and the manufacture of clothing for the wholesale trade is increasing at a rapid rate. Minneapolis is also a furniture manufacturing centre. Office and school desks made here are sold in all parts of this country and also shipped abroad. The manufacture of iron and steel has increased very largely in the last few years, and this bids fair to become one of the leading industries of the city. On account of the number of flour mills the making of boxes and barrels is an industry of great importance. The nearness of the city to the flax fields has made the manufacture of linseed oil an extensive industry. The manufacture of paper is carried on here, and the brewing interests are also heavy. Indeed, it would be difficult to name any kind of manufacturing which is not carried on in Minneapolis, and the rapid growth of the country tributary to it gives promise of a rapid development of all manufacturing industries in the immediate future.

Parks.— The natural advantages of Minneapolis have been of great value in the development of its park system, upon which much money has already been expended, and the system, when fully completed, will be one of the most beautiful in the country. The park area is about 1,800 acres, and its estimated value over $5,000,000. The driveways, which come under the control of the Park Board, aggregate nearly 30 miles in length. Connected with the system and lying within the city limits are four beautiful lakes, the largest of which, Calhoun, over a mile long, is less than three miles from the business centre of the city, with which it is connected by a fine boulevard as well as by an electric railway. Harriet, the second in size, is a short distance farther away, and during the summer months is the favorite resort of thousands of people. The remaining lakes are Cedar Lake and Lake of the Isles. Minnehaha Falls, made famous by the poet Longfellow, is also within the city limits and under the control of the Park Board, and is always a point of great interest to visitors from other cities, as well as a favorite resort for the children of Minneapolis. Steps are now being taken to further improve the banks of the Mississippi and when the plans are carried into effect the drive along the river will be most beautiful.

Schools and Colleges.— Minneapolis is recognized as the educational centre of the Northwest. It has an efficient system of public schools with 60 school buildings, 1,000 teachers, and about 40,000 pupils. Great interest is taken in the school system by the people, and they contribute generously to its support. There are four high schools which annually enroll about 4,000 pupils. Minneapolis is also the seat of the University of Minnesota, which has become one of the largest institutions in the country, the enrolment during the year of 1910 being 5,369. Excellent courses of study are presented in all departments and it takes high rank among the universities of the West.

Public Buildings.— Minneapolis is noted for its public buildings, among which will be found some of the finest in the West. The courthouse and city-hall covers an entire block. It is built of granite, is five stories high, and has a tower 400 feet in height; and cost about $3,500,000. Among the other fine buildings are the Public Library, Guaranty Loan Building, New York Life Building, Andrus Building, Chamber of Commerce, Masonic Temple, Syndicate Block, Glass Block, Lumber Exchange, and West Hotel.

Railroads and Water Routes.— The transportation facilities of Minneapolis are excellent. Ten different lines of railway are represented with their branches and subdivisions, and all have large terminal facilities in the city. Seven railways connect Minneapolis directly with Chicago. The completion of the improvements in the Mississippi River between Saint Paul and Minneapolis will make Minneapolis the head of navigation and give direct water connection with the Gulf of Mexico. The United States government will expend several hundred thousand dollars in these improvements.



COURT HOUSE AND CITY HALL, MINNEAPOLIS.

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Street Railways.— Minneapolis has a fine system of electric railways, reaching into all sections of the city, and affording direct connection with all the parks and other places of interest. It is owned by the Twin City Rapid Transit Company, which also controls the system in Saint Paul, with which city Minneapolis is already connected by two interurban roads, and a third is being built. The entire system covers 250 miles. Electricity, which is the motive power, is generated by the water power at the Falls. The company also has a manufacturing plant in the city where it manufactures its own cars and carries on its extensive work of repairs.

Churches.— Minneapolis has a large number of churches, all denominations being represented. Among the finest church buildings are Wesley Church (Methodist), Westminster Church (Presbyterian), and Church of the Redeemer (Universalist). Of the Protestant denominations the Lutherans have the largest membership. Among the other large denominations are the Congregationalists, the Presbyterians, the Methodists, the Baptists, and the Episcopalians. The Roman Catholics have many churches. Pop. (1870), 13,066; (1880), 46,887; (1890), 164,738; (1900), 202,718; (1910) 301,408.

Chas. M. Jordan,
Superintendent Minneapolis Public Schools.

Minneapolis, Kan., city, county-seat of Ottawa County; on the Solomon River, and on the Atchison, T. & S. Fe and the Union P. R.R.'s; about 130 miles west of Topeka. It is in an agricultural and stock raising region. Its chief industrial establishments are flour-mills, grain elevators, foundry, carriage shops, and creamery. Stone quarries in the vicinity contribute to the industries of the city. The principal buildings are the churches and the school. The public library has about 3,000 volumes. Pop. 2,000.

Minnehaha, mĭn-ĕ-hä'hä, **Falls of** (Sioux, *Mini-haha,* «laughing water»), a cascade in the Minnehaha River, now in Minnehaha Park, which belongs to Minneapolis, Minn. The cascade has a fall of about 60 feet, and is in a picturesque glen which extends to the Mississippi River. Just below the falls the river is spanned by a rustic bridge. The name has become world-known through Longfellow's 'Hiawatha.'

Minnequa, mĭn-ĕ-kwâ', or **Minnequo Springs,** Pa., a summer watering resort in Canton Township, Bradford County, picturesquely situated in a glen, surrounded by wooded hills, on the Northern Central railroad, 36 miles south of Elmira. It is frequented for its medicinal mineral springs containing carbonates of soda, magnesia, lime, etc.

Minnesinger, mĭn'ĕ-sĭng-ĕr, or **Minnesänger** (from Old German *minne,* love), the name given to the German lyric poets of the 12th and 13th centuries on account of love being the chief subject of their poems. The cradle of German lyric poetry was Upper Austria. The earliest German poetry was chiefly narrative, and this not only when past events formed the poet's theme, but also when he celebrated present occurrences. But this contact with the present naturally gave occasion to the expression of the poet's feelings, and gradually led to the lyric pure and simple. Such was the origin of the oldest extant poems of Dictmar von Eist (1143–70) and others. But the development of German lyric poetry was greatly hastened by the influence of the French poetry of the same class, which at that time flourished in Champagne and Flanders. The immediate effects of this French influence were greater strictness and variety in the versification, a greater preponderance of the subject of love, and a more purely lyrical treatment. The Westphalian Heinrich von Veldeken, afterward regarded by the minnesingers as the true father of their art; Friedrich von Hausen, a native of the Palatinate; the Thuringian Hugo von Salza; the Saxon Heinrich von Morungen; the semi-mythical Heinrich von Ofterdingen; and the two Swabians Heinrich von Rucke and Ulrich von Gutenburg, were the chief minnesingers of the latter half of the 12th century. The 13th century witnessed the highest cultivation of the minnesong, and also the beginning of its decay. Its greatest masters are Walther von der Vogelweide, Wolfram von Eschenbach, Gottfried von Strassburg, and Hartmann von Aue. After the art had ceased to be practised by the minnesingers, it was taken up by the artisans of the towns under the name of meistersingers (q.v.).

Minnesota, mĭn-ĕ-sō'ta, one of the States of the Union, almost in the exact centre of the northern boundary, situated between lat. 43° 30' and 49° N. and lon. 89° 29' and 97° 5' W. It is bounded on the north by the Northwest Territories of British America, on the east by Lake Superior and the State of Wisconsin, on the south by Iowa, and on the west by North and South Dakota. It has alternately been termed the «North Star» and the «Gopher» State, the former appearing upon the official seal, but at the Pan-American Exposition at Buffalo in 1901 the name «Bread and Butter State» was suggested by the exhibits of breadstuffs and dairy products made by Minnesota. It takes its name from two Sioux words meaning «sky-colored water.» The floral emblem of the State is the moccasin flower, or ladyslipper. The Territory of Minnesota was organized in 1849 and the State admitted into the Union, 11 May 1858.

Extent and Population.—Minnesota has an extreme length, from north to south, of 380 miles, and its breadth varies from 263 to 338 miles. It has an area of 83,365 square miles, or 53,353,600 acres, including over 10,000 lakes, occupying an estimated surface of 4,300 square miles. The thirteenth census of the United States in 1910 showed the population of Minnesota to have been 2,075,708. Comparison with the previous decennial periods is as follows:

CENSUS YEARS.	Pop.	Increase.	
		No.	Per Cent.
1910....................	2,075,708	324,314	18.5
1900....................	1,751,394	449,568	34.5
1890....................	1,301,826	521,053	66.7
1880....................	780,773	341,067	77.6
1870....................	439,706	267,683	155.6
1860....................	172,023	165,946	2,730.7
1850....................	6,077	....	....

History.— The area of Minnesota, when it first became known to white men, was occupied by the Dakota (or Sioux) and the Ojibway (or Chippewa) Indians. Advancing from the region of Lake Superior, the Ojibways, in their almost continual wars with the Sioux, wrested from them the region of Mille Lacs about the year 1750, and were thenceforward in possession of nearly all the wooded northeastern two fifths of Minnesota, while the Sioux held its great prairie country on the south and west. But the outbreak of the Sioux in 1862 caused them to lose their homes here, being driven into the Dakota Territory. About 8,000 Ojibways live now on reservations in the northern part of the State. Previous to the settlement and occupation of this area by the white immigration, which may be said to have begun when the Territory of Minnesota was organized, in 1849, there were nearly two centuries of gradually increasing knowledge of the geography of this State. During the first century its explorers were the French, chiefly led to this distant region for the profits of the fur trade. After the British conquest of Canada, the explorers were English-speaking fur traders and travelers; and in the later expeditions were sent by the United States government to acquire information of the unsettled parts of the Northwest Territory and the northern part of the Louisiana Purchase.

The history of Minnesota is thus divisible into three parts: (1) The period of French exploration, 1655 to 1763, the date of the cession of Canada to the English; (2) The period of English colonial and United States exploration, 1763 to 1849; (3) The period of development as a Territory and State, 1849 to the present time. After the discovery of the lower Mississippi in 1541 by the ill-fated De Soto, 114 years passed before this river was next seen by Europeans. Then, in the year 1655, two hardy French explorers, Groseilliers and Radisson, appear, according to the narrative of the latter, to have crossed Wisconsin to the Mississippi, and to have voyaged up the river to the large island in Minnesota, now called Prairie Island, west of the main channel of the Mississippi above Lake Pepin, between the present sites of the cities of Red Wing and Hastings. This was during the first two expeditions, in each of which these earliest pioneers of exploration in Minnesota advanced far beyond all who had preceded them. In 1679–80, DuLuth and Hennepin were in Minnesota, at Mille Lacs and on the Mississippi; Le Sueur explored the Mississippi and Minnesota rivers in 1683–1700; and in 1731–49 Verendrye and his sons established trading posts along the northern boundary of Minnesota. Soon after Canada was ceded to the English, a colonial captain, Jonathan Carver, traveled in 1766 from Boston to Minnesota, and wintered among the Sioux Indians near the site of New Ulm. In 1798, David Thompson traversed and mapped the region of Red Lake and of the Turtle Lake and river, the latter being tributary to the Mississippi near its source. In 1804, William Morrison was at Itasca Lake, the head of the Mississippi, and in 1832 this lake was visited and named by Schoolcraft.

The first United States government expedition sent into this area was led by Lieut. Zebulon M. Pike, in 1805, only two years after the Louisiana Purchase, which included the western two thirds of Minnesota, on the west side of the Mississippi River. Pike wintered on the Mississippi at Pike Rapids, near Little Falls, and visited the fur trading posts on Sandy, Leech and Cass lakes. He obtained from the Sioux, by a treaty, a tract adjoining the mouth of the Minnesota River and reaching to the site of Minneapolis, for military uses; and on this tract, on the bluff at the junction of the Minnesota with the Mississippi, Fort Snelling, at first called Fort Saint Anthony, was built in 1819–22. The first steamboat, the Virgina, came up the Mississippi to Fort Snelling, 10 May 1823. A second exploring expedition, under the command of Gen. Lewis Cass, came from Detroit in 1820, passing through Lakes Huron and Superior to Sandy Lake and thence up the Mississippi to Cass Lake, which was so named at this time by Schoolcraft, the historian of the expedition. Three years later, Major Stephen H. Long, with a military escort and several scientists, traversed the country west and north from Fort Snelling to the Red River and Lake Winnipeg, and returned east along the canoe route of the northern boundary to Lake Superior. Beltrami, an Italian political exile, was in Long's company to the vicinity of Pembina, and thence traveled alone, or with Indian companies, past Red and Turtle lakes, and down the Mississippi to Fort Snelling. Among the later explorers were Schoolcraft, Featherstonhaugh, Catlin, and Nicollet, the last making a most admirable map in 1842, of the upper Mississippi country before it had any agricultural settlement.

Minnesota was organized as a Territory by Governor Alexander Ramsey, 1 June 1849, then extending west to the Missouri River. It was admitted to the Union as a State, 11 May 1858, with its present area. The first governor of the State was Henry H. Sibley, and the second State governor through the early part of the Civil War was Alexander Ramsey, later United States senator (1863–75). In 1851, by treaties with the Sioux, Governor Ramsey and Luke Lea, commissioners for the United States, acquired the fertile prairie region of southern and southwestern Minnesota for white settlement. On 18 Aug. 1862, an outbreak of the Sioux began in which 800 of the settlers were massacred; 23 September, the hostile savages were overwhelmingly defeated by General Sibley in the battle of Wood Lake; their white prisoners, about 150 women and children, were released; many of the captured Sioux were soon afterward tried, and in December 38 were executed at Mankato. In the ensuing frontier campaigns of 1863 and 1864, the Sioux, who had fled into the Dakota Territory, were severely chastised. Governor Ramsey, in April 1861, was the earliest among the governors of the States to tender troops to President Lincoln at the beginning of the Civil War. During this war 12 regiments were raised by this State and, with later recruits for these regiments and enlistments of Minnesota men in other States, about 25,000 of her citizens served in the War.

Topography.— The chief topographic features of Minnesota are as follows: the valley of the Mississippi River, from Lake Pepin southward, several miles wide, and enclosed by bluffs 200 to 600 feet high; the basin of the Minnesota River, a slightly undulating expanse, 900 to 1,100 feet above the sea; the broad and flat

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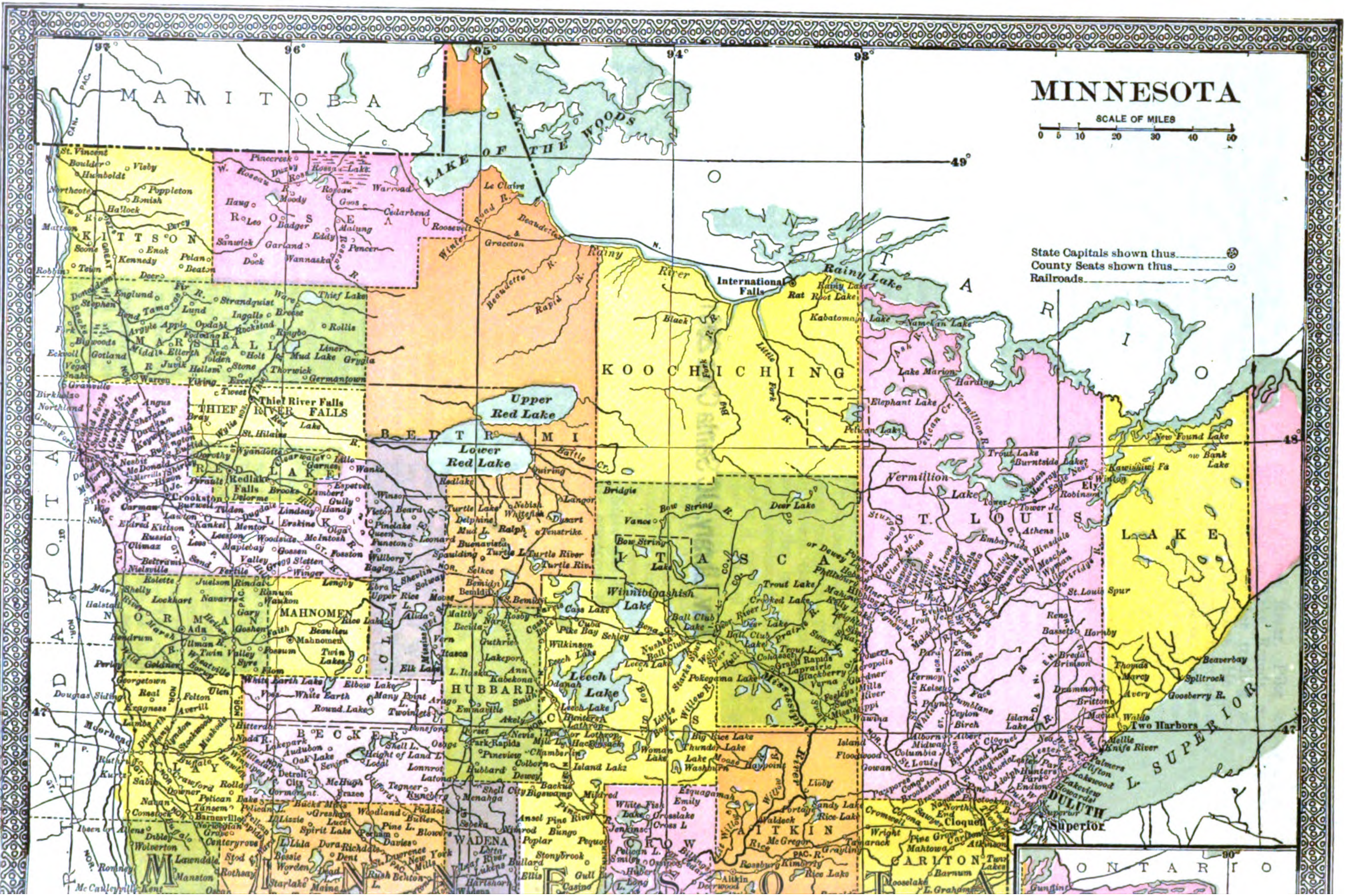
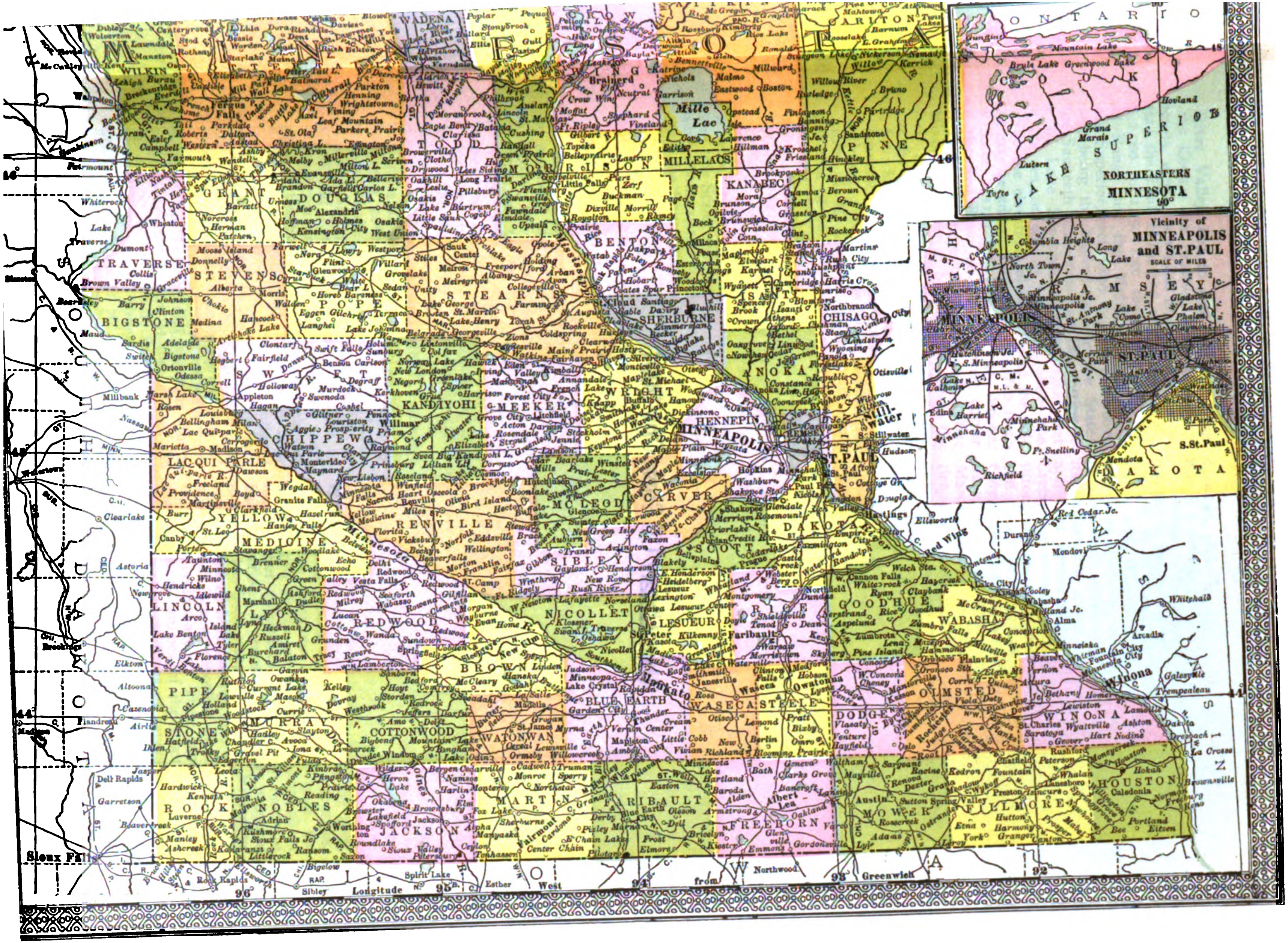

MINNESOTA
SCALE OF MILES
0 5 10 20 30 40 50
State Capitals shown thus
County Seats shown thus
Railroads
MANITOBA
ONTARIO
DAKOTA
LAKE OF THE WOODS
Rainy Lake
Rainy River
L. SUPERIOR
Upper Red Lake
Lower Red Lake
Leech Lake
Winnibigoshish Lake
KITTSON
ROSEAU
MARSHALL
THIEF RIVER FALLS
RED LAKE
POLK
NORMAN
MAHNOMEN
CLAY
BECKER
CLEARWATER
HUBBARD
BELTRAMI
KOOCHICHING
ITASCA
CASS
CROW WING
AITKIN
CARLTON
ST. LOUIS
LAKE
WADENA
International Falls
Duluth
Superior
Two Harbors
Crookston
Moorhead
Bemidji
Thief River Falls
Grand Forks
49°
48°
47°
97°
96°
95°
94°
93°
90°


MINNESOTA
NORTHEASTERN MINNESOTA
ONTARIO
LAKE SUPERIOR
COOK
Grand Marais
Vicinity of MINNEAPOLIS and ST. PAUL
SCALE OF MILES
RAMSEY
HENNEPIN
DAKOTA
MINNEAPOLIS
ST. PAUL
S. St. Paul
SOUTH DAKOTA
IOWA
WISCONSIN
Longitude West from Greenwich
WILKIN
GRANT
DOUGLAS
TODD
WADENA
CROW WING
MILLE LACS
KANABEC
PINE
CARLTON
AITKIN
MORRISON
BENTON
SHERBURNE
ISANTI
CHISAGO
ANOKA
WASHINGTON
TRAVERSE
STEVENS
POPE
STEARNS
BIGSTONE
SWIFT
KANDIYOHI
MEEKER
WRIGHT
CHIPPEWA
LAC QUI PARLE
YELLOW MEDICINE
RENVILLE
MC LEOD
CARVER
SCOTT
SIBLEY
NICOLLET
LESUEUR
RICE
GOODHUE
WABASHA
LINCOLN
LYON
REDWOOD
BROWN
BLUE EARTH
WASECA
STEELE
DODGE
OLMSTED
WINONA
PIPESTONE
MURRAY
COTTONWOOD
WATONWAN
ROCK
NOBLES
JACKSON
MARTIN
FARIBAULT
FREEBORN
MOWER
FILLMORE
HOUSTON
Mille Lac
Mississippi
Minnesota
Sioux Falls
96°
95°
94°
93°
92°
46°
45°
44°

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Red River Valley, 800 to 950 feet above the sea; the Coteau des Prairies, in southwestern Minnesota, which rises 1,800 to 1,950 feet above the sea; the Leaf Hills, 100 to 300 feet high, being 1,000 to 1,750 feet above the sea; the Giants Range and the Mesabi Range, north of Lake Superior, each 1,800 to 2,200 feet above the sea, being the highest land in the State; and the Sawteeth Mountains near the northwest shore of Lake Superior, 1,500 to 1,800 feet above the sea, or 900 to 1,200 feet above the lake. To the elevations already stated the following may be added: Lake Superior, 602 feet; Rainy Lake, 1,117; the Lake of the Woods, 1,060; the Red River at the northwest corner of the State, low stage 748; Lake Itasca, 1,462; the Mississippi River at Minneapolis, above the Falls of Saint Anthony, 800; in Lake Pepin, 664; at the southeast corner of the State, low stage, 616; Red Lake, 1,172; Mille Lacs, 1,251; Lake Traverse, 970; Big Stone Lake, 962; and the southwest corner of the State, about 1,400 feet. Prof. N. H. Winchell estimates the average elevation of the entire State to be approximately 1,275 feet above the sea. The river systems of Minnesota include that of the Mississippi, draining about 48,700 square miles of this State, or more than half of its whole area, which is 84,286 square miles; the Missouri River, whose basin includes about 1,700 square miles in this State; the Red River of the North, draining about 15,100 square miles in Minnesota, and the Rainy River, about 10,300, making 25,400 square miles tributary to Hudson Bay; and the basin of Lake Superior and the St. Louis River, tributary to the St. Lawrence, about 8,500 square miles. It is estimated that this State contains 1,000 lakes and the part of its area occupied by water is approximately 5,600 square miles. But there are few or no lakes in the southeast and southwest corners of the State, beyond the outermost moraines of the glacial drift, nor on the flat land of the Red River Valley. Forest originally covered the northeastern two thirds of Minnesota; while the other third, at the south and southwest, and reaching in the Red River Valley to the international boundary, was prairie.

Climate.— The mean annual rainfall, as known by long series of records, is about 34 inches in the southeast corner of Minnesota, 28 to 32 inches about Lake Superior and Rainy Lake; thence diminishing westward to 22 inches at Moorhead and Fargo, and nearly the same at Lakes Traverse and Big Stone, on the west boundary of the State. It is about 28 inches at Saint Paul and Minneapolis. The mean temperature for the year is 46° F. in the southeast corner of the State; 44° at Saint Paul and Minneapolis; and 36 to 34° in northern Minnesota. For January, the coldest month, the mean is 14° in the southeast corner; about 12° at Saint Paul, Minneapolis, and Duluth; and thence it diminishes northwestward to zero at the Lake of the Woods and 2° below zero at Saint Vincent, in the northwest corner of Minnesota. For July, the warmest month, it is 76° in the southeast and southwest corners; 74° at Saint Paul and Minneapolis; about 72° at Moorhead and Fargo; 68° at Saint Vincent; and 64 to 62° in northeastern Minnesota north of Lake Superior. The elevation of this State above the sea, its fine drainage, and the general dryness of the air, give it a climate of unusual healthfulness.

Geology.—The rock formations of Minnesota, mapped in the geological survey of the State, by Prof. N. H. Winchell, the State geologist (1872-1901), with Warren Upham, U. S. Grant, and others, as assistants, are as follows: glacial and modified drift, spread over all the State excepting its southeastern corner; Fort Pierre, Niobrara, and Fort Benton shales and sandstones, of the Cretaceous series, thinly occupying many tracts throughout the western two thirds of the State, and thickly developed as the chief mass of the Coteau des Prairies, beneath the drift; Devonian limestones and shales, of the Hamilton and Marcellus epochs in Fillmore and Mower counties, and extending into Iowa; Silurian limestone and shales, belonging to the Hudson River and Trenton epochs, reaching from Minneapolis and Saint Paul south and southeast to Fillmore county and northeastern Iowa; Cambrian sandstones and limestones, including the St. Peter sandstone, Shakopee limestone, Jordan sandstone, regarded as the equivalents of the Chazy and Calciferous formations in the northeastern States and Canada, extending in southeastern Minnesota from the Kettle River and Taylor's Falls southwest to the lower portions of the Minnesota and Blue Earth rivers, and occupying a considerable belt along the St. Croix and Mississippi rivers to the southeast corner of the State; the Keweenawan or Cupriferous series, of Lower Cambrian and Algonkian age, consisting of red sandstone conglomerate, and trappean rocks, on the border of Lake Superior, and in Pine, Chisago, and Kanabec counties, but in southwestern Minnesota being mainly red quartzite, exposed near New Ulm, and thence in a few areas westward to Pipestone and Rock counties, in the southwest corner of the State; and the Archæan system, of gneisses and granites, schists and slates, together covering more than half of the State, reaching on the international boundary from the Lake of the Woods east to Lake Superior, and extending thence southwest to the Minnesota River between Big Stone and New Ulm, but terminating about 30 miles southwest of this river.

During the Glacial period or Ice age, the latest completed geologic period before the present, this State was enveloped by the northern ice-sheet, excepting a tract on its southeast border, which was a part of the Driftless area. When the ice-sheet was melted away, its drift was left as a general covering of the bed-rocks, the average thickness of the drift upon the western two thirds of the State being about 100 feet, but toward the east, as also north of Lake Superior. A series of the twelve marginal moraines has been mapped, crossing Minnesota, being belted of hilly, knolly, and ridged drifts, with a much larger proportion of boulders than on the smoother areas. These moraines mark the successive outlines of the front of the departing ice-sheet, at times of pauses or slackening of its general retreat and marginal melting.

In the Red River Valley, sloping northward in the direction of the glacial recession, a great ice-dammed lake, named by Upham the Glacial Lake Agassiz, was held by the waning ice-sheet, which was its northern barrier. This ancient lake attained a length of about 700 miles, extending far into Manitoba and the Saskatchewan basin, with a maximum width of about 200 miles and an area of 110,000 square miles, or more, thus exceeding the combined areas of the five Great Lakes tributary to the St. Lawrence. The outlet of Lake Agassiz eroded Brown's Valley, between Traverse and Big Stone lakes, and flowed thence along the course of the Minnesota River into the Mississippi. Many ridges of sand and gravel, and extensive sand deltas, along the sides of the Red River Valley, show the successive boundaries of this old glacial lake, which sank from higher to lower levels as its channel of outlet was deepened, and when later it flowed by other outlets northeastward. Finally, by the continued recession of the ice-sheet, Lake Agassiz was reduced to its present representative, Lake Winnipeg, uncovering the fertile valley of the Red River, now the most productive wheat district of our continent.

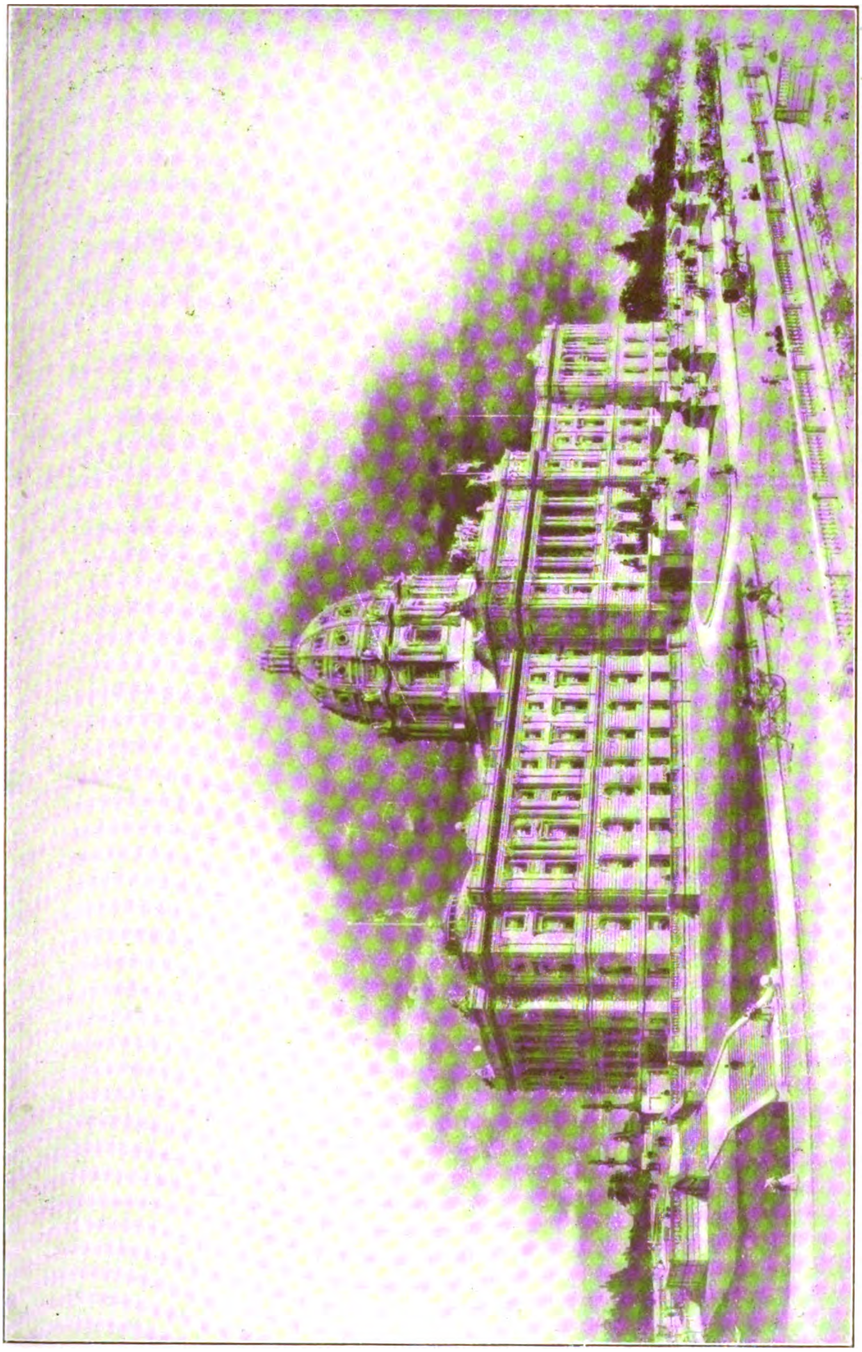
Farming and Agricultural Products.—Minnesota is the thirteenth State in the Union in area. There were in 1910 155,759 farms aggregating 27,623,000 acres, of which about 20,000,000 is improved land. Thousands of acres of swamp land worth $2 an acre have been reclaimed by the ditchwork system perfected by the State Drainage Commission and are worth to-day $10 an acre. This work is in its infancy as yet, and consequently thousands of acres remain to be reclaimed to agricultural purposes. The total value of farm lands and buildings in the State is $1,259,510,000, and the farm implements and machinery represent about $52,243,000. The total value of the leading crops for the crop year 1909 was $181,768,084. Wheat is the most important single crop in Minnesota. In wheat raising Minnesota ranks first among all the States of the Union. Over half of the State's acreage is in wheat. The wheat crop ranges from 90,000,000 to 100,000,000 bushels a year. Minnesota produces one seventh of all the wheat raised in the United States. Minnesota also raises one fifth of all the barley raised in the country and ranks second among barley-producing States, with an average crop of 30,000,000 bushels annually. In the value of all cereals raised Minnesota ranks fourth among the States, with a total crop of 260,000,000 bushels and a crop value of $90,000,000. Minnesota produces 75,000,000 to 90,000,000 bushels of oats and 15,000,000 bushels of potatoes annually, ranking fourth in oat production and ninth in potato production. As an adjunct of the purely agricultural products of the State the creamery interest is one of the great industries of the State. Minnesota ranks fifth in the value of her dairy products. There are in the State 700 creameries which are supplied by 54,000 farmers who milk 420,000 cows. These creameries buy 1,500,000,000 pounds of milk every year and make 76,000,000 pounds of butter yearly, which is sold for $18,000,000, of which amount $13,000,000 is paid to the patrons. The creamery industry is a small part of the total dairy industry of the State. Half a million cows do not contribute to the creameries. The total dairy product of Minnesota is $35,000,000 yearly.

Manufacturing.— The manufactures of Minnesota are well known. Most important of these is flour and grist milling. In this industry there are over 500 establishments with 4,000 employees, and with products valued at $84,000,000. In 1821 a saw-mill, the first manufactory in Minnesota, was built on the west side of the falls of Saint Anthony. In 1823 it was fitted for the grinding of flour. A second mill was built in 1843, but for some time the development of the flour and grist milling industry was very slow. About 1870 the «low grinding» process, by which the wheat was reduced to flour in one operation, began to give place to the new «milling,» in which a number of distinct operations were employed. The falls of Saint Anthony offered superior power facilities, and the millers in that section found a market for their products at profits not elsewhere realized. Minnesota has about 10 per cent of the total capital invested in the United States in flouring and grist mill products, and in this respect was first among the States.

Second among the industries of the State is the manufacture of lumber and timber products, with 438 establishments, 15,140 employees, and products valued at $43,585,161. The forest resources of the State are very extensive. There are about 52,200 square miles of woodland (stump-lands included), extending over the northern two thirds of the State. Minnesota has done much to promote forest preservation and development. The characteristic products are white and Norway pine, spruce also being abundant. The quantity of merchantable forest pine was estimated in 1900 to be greater in Minnesota than in any other State. Minnesota was then third among lumber-producing States of the Union. The numerous small lakes and streams, many connected with the Cloquet and Saint Louis rivers or Lake Superior, have been of great advantage. In 1900 the quantity of lumber sawed in the State, exclusive of lath, shingles, etc., was 623,000,000 feet.

Mines and Mining.—The larger part of the iron ore of the United States is furnished by the Lake Superior region, originally restricted to Michigan only, but now including Michigan, Wisconsin, and Minnesota. Minnesota was far ahead in 1909 with 28,975,149 long tons. In 1909 the output of ore for the Lake Superior region was 41,942,969 long tons, representing 81.77 per cent of the total quantity reported for the United States. This region includes five ranges,—the Marquette, Menominee, Gogebic, Mesabi, and Vermilion. The Marquette range is in Michigan; the Menominee and Gogebic are partly in Michigan, partly in Wisconsin; and the Mesabi and Vermilion are in Minnesota. The first three mentioned were opened in 1854, 1877, and 1884, respectively. The Mesabi dates from 1892, the Vermilion from 1884. In 1904 the report of the United States Geological Survey for the calendar year of 1902 on the 'Mineral Resources of the United States' stated that to the close of 1902 the Vermilion range had shipped a total of 19,061,506 long tons, the Mesabi 53,747,807 long tons. In 1909 the output of the Vermilion was 1,097,444 long tons, that of the Mesabi 10,152,691 long tons. This latter output was more than half of the total for the Lake Superior region, as given above, and was about 40 per cent of that for the United States. The Vermilion in 1902 was fifth among ranges, and the 15,137,650 long tons constituting the output of the Vermilion and Mesabi ranges were valued at $23,-

MINNESOTA.



CAPITOL AT ST. PAUL.

Univ. Library, UC Santa Cruz 2001

989,227, an average of $1.58 per ton. This represented an increase of 4,028,113 long tons over the output for 1901, or 36 per cent. It is a larger amount than was mined in the entire United States prior to 1890. The mines at present developed in Minnesota are all in the Vermilion and Mesabi ranges. The chief points of shipment are the ports of Two Harbors and Duluth in Minnesota, and Superior in Wisconsin. According to an estimate compiled early in 1904, the output for 1903 showed a decline both for the Lake Superior region and for the Vermilion and Mesabi ranges.

Education.— There are in the State 8,800 public school-houses valued at $18,000,000. There are 415,000 pupils, and 13,000 teachers, who draw in salaries $4,750,000 annually, an average salary of $44.00 a month. There are 155 State high schools which draw special aid of $2,000 yearly and 121 graded schools which draw $800 a year in special aid. There are five normal schools (Winona, Mankato, St. Cloud, Moorhead, and Duluth) with a total enrolment of 2,600. The State University ranks third in point of enrolment among the universities of the country. The State Agricultural College ranks first among all the schools of this kind in America, and foreign governments send representatives to the Minnesota Agricultural School for special training. The total permanent school fund in 1903 was $15,600,000. The State auditor says that in 1910 it will be $35,000,000. The permanent university fund is $1,500,000.

Penal and Charitable Institutions.—There are five insane hospitals, a school for the blind, a school for the deaf, a school for the feeble-minded, a State public school for dependent children, a State training school, a State reformatory and a State prison. These institutions are under the supervision of a State board of control. These institutions cover 5,400 acres of land, and the total value of their property is $5,600,000. The annual gross expenditures for these institutions in $1,200,000. The total number of inmates is 6,700, of which 4,000 are in the insane asylums; 90 in the school for the blind; 275 in the school for the deaf; 900 in the school for the feeble-minded; 260 in the school for dependent children; 400 in the State training school, 200 in the State reformatory and 500 in the State prison. The various State institutions produce annually $125,000 worth of farm and garden produce for their own use and for sale. The feature of the State prison is the twine plant, which manufactures 9,000,000 pounds of twine yearly. The twine is sold to the farmers of Minnesota at cost, or about two cents under the market value of twine.

Railroads.— Thirty-three railway companies, inclusive of six terminal corporations, have trackage in Minnesota, the total mileage being 7,166. The total cost of construction to 30 June 1902 was $283,444,660. For the fiscal year of 1902 the gross earnings within the State were $51,868,191, and the operating expenses $28,007,439. Upon the basis of gross earnings, the railroads paid into the State treasury, in taxation, in 1902, $1,659,071. For the tax year of 1903 the gross earnings were $66,193,731.99 and the taxation $1,922,204.22.

Finances.— The total assessed valuation of Minnesota is $780,000,000, the present rate of taxation is .23, the total bonded indebtedness of the State a little less than one million dollars. The payments from the State treasury last year amounted to $7,500,000. In 1903 there were 288 State banks under the supervision of the State bank examiner. These banks have a capital stock of $7,800,000 and deposits of $22,000,000. There are 12 savings banks with a capital of $200,000 and deposits of $18,424,664. There are 8 trust companies with a capital of $2,000,000 and deposits of $2,395,073. There are 184 national banks in the State with a total capital stock of $16,763,825.

Saint Paul is the capital. Under a territorial agreement by which that city became the seat of government, Minneapolis secured the university and Stillwater the State prison. The State recently completed a handsome capitol which, with its parks and approaches, cost approximately $5,000,000. The reapportionment made in 1901 gave Minnesota nine congressional districts and eleven votes in the electoral college. For legislative purposes, the State is divided into 63 senatorial districts, electing an equal number of senators, for four year terms, and 119 members of the house of representatives for two year terms.

Political.— Minnesota is recognized as an impregnable Republican State. But twice since its organization has it chosen a Democratic governor, upon which occasion local issues controlled the result. The State gave 83,000 Republican majority in the last presidential election and in 1902 returned eight out of nine Republican members of Congress.

Bibliography.— Bryant, ‘History of the Great Massacre by the Sioux Indians in Minnesota’ (1863); Heard, ‘History of the Sioux Wars’ (1863); Flandrau, ‘The History of Minnesota’ (1900); Neill, ‘The History of Minnesota’ (1882); and the publications of exploration and travel by Radisson, Hennepin, Perrot, Charlevoix, Carver, Pike, Schoolcraft, Keating and Long, Beltrami, Featherstonhaugh, Nicollet, and many later writers.

H. T. Black,
Editor ‘Saint Paul Dispatch.’

Minnesota, a river which has its rise in the northeastern part of South Dakota, flows through Big Stone Lake on the boundary between Minnesota and South Dakota, then flows southeast in Minnesota a distance of about 350 miles, to where it receives the waters of the Blue Earth, when it turns and flows northeast to the Mississippi River. It enters the Mississippi just south of Minneapolis and opposite Saint Paul. The head waters of the Minnesota and of the Red River of the North are but a short distance apart. The Minnesota is navigable to a rapids about 40 miles from its mouth, and for small vessels nearly 300 miles above the rapids. Its whole length is about 475 miles.

Minnesota, The University of, a State institution at the head of the system of public education in Minnesota, located in Minneapolis, on the east bank of the Mississippi River. Its grounds comprise about 50 acres, and are so situated as to command a good view of the Falls of Saint Anthony and of the Mississippi River. The University Farm belonging to the State School of Agriculture contains 250 acres and is three miles distant from the University. The charter of the University was granted by the territorial legislature 13 Feb. 1851, when the Territory contained less than 10,000 inhabitants. The State constitution, adopted 13 Oct. 1857, confirmed to the University all rights previously granted to it by the legislature. The institution was organized as a college in 1869, and opened 15 Sept. 1869, with a faculty of nine professors. William W. Folwell, LL.D., a graduate of Hobart College, was its first president and filled the office till 1884. Cyrus Northrop, LL.D., a graduate of Yale University and for 21 years a professor in Yale, was elected president in 1884.

The University consists of the following departments: (1) the College of Science, Literature and Arts; (2) the College of Engineering and Mechanic Arts; (3) the College of Agriculture; (4) the College of Law; (5) the College of Medicine and Surgery; (6) the College of Homœopathic Medicine and Surgery; (7) the College of Dentistry; (8) the College of Pharmacy; (9) the School of Mines; (10) the School of Chemistry; (11) the School of Agriculture; (12) the Graduate Department. The management of the University is vested in a board of 12 regents, of whom the governor of the State, the president of the University, and the State superintendent of public instruction are ex-officio members, and nine others are appointed by the governor and confirmed by the senate. The financial affairs of the University, except the salaries of instructors, are regulated by an act of the legislature passed in 1901, subject to the approval of the State Board of Control. The real estate, land and buildings of the University are valued at about $2,000,000, and its invested fund is about $1,400,000. The total attendance of students in 1910 was 5,369, of whom 1,179 were women. The number of professors and instructors in 1910 was 385. There are 18 buildings on the University campus, and 13 buildings on the farm with which the School of Agriculture and the experiment station are connected.

The University is supported by the State. Its fees required of students are nominal, except in the professional schools. One of the finest buildings on the campus is the gift of the late Ex-Governor John S. Pillsbury, who was for many years president of the board of regents, and to whose never-failing devotion the institution is largely indebted for its prosperity. The library contains 110,000 volumes. The requirements for admission are a full four years' course in a high school or its equivalent. Candidates for admission to the College of Medicine and Surgery are required to have completed, in addition to a high school course, two years' work in the University or some other college the educational facilities of which are approved by the board of regents. A special six-years course has been provided by which both the degrees of B.A. and M.D. may be obtained — the first two years being in the College of Science, Literature and Arts, and the last four years being the regular course in medicine.

Cyrus Northrop,
President University of Minnesota.

Minnewauhon, mĭn-nē-wâ'hŏn, N. Dak., village, county-seat of Benson County; on Minnewauhon Lake; on the Great Northern railroad; about 115 miles northeast of Bismarck. It has lumber-mills and a grain elevator. It has considerable trade in wheat and lumber. Pop. 500.

Minnewaukon, mĭn-nē-wâ'kŏn, or **Devil's Lake,** in North Dakota, one of a group of salt lakes which have no apparent outlet. It is about 50 miles long and averages 15 miles in width; area, 750 square miles. The color of the water is darker than that of the fresh waters south. The water is too brackish to be used by men, but the wild animals of the surrounding region seem to like it. Several villages and trading posts are on its shores.

Minnow, a small fresh-water fish; originally a small European fish of the carp family (*Leuciscus phoxinus*). In the United States most of the minnows are of the same family (see Cyprinidæ), and are widely known as "shiners" on account of the silvery character of the scales. "The spring or breeding dress of the male is often very peculiar, the top of the head and often the fins and portions of the body are covered with small tubercles, outgrowths from the epidermis; the fins and lower parts of the body are often charged with bright pigment, the prevailing color of which is red, although in some genera it is satin-white, yellowish, or even black" — Jordan. These little fishes live in clear brooks for the most part and go about in companies, which furnish food for larger fishes. Many of them afford good sport to young anglers; and all are sweet pan-fish, but very bony. They are of decided value, however, as live-bait. Most of the Eastern examples belong to the genus *Notropis*. (See Top-minnow.) Consult: Jordan, ‘Vertebrates of the Northern United States’ (1890).

Minor, mē'nôr, **Jakob,** Austrian scholar: b. Vienna 15 April 1855. He was educated at Vienna and Berlin, and became professor of German language and literature at Prague (1884) and of Teutonic philology at Vienna. Besides numerous editions of texts, he published ‘Neuhochdeutsche Metrik’ (1893), an excellent study in prosody, and a valuable incomplete work on Schiller (2 vols. 1890).

Minor, mī'nôr, **Robert Crannell,** American painter: b. New York 1840; d. 1904. He studied at Barbizon and became a pupil of Diaz. He subsequently went to Antwerp and was taught by Van Luppen and Boulanger, making a specialty of landscape. His student travels led him through Germany and Italy, and on returning to New York he was elected to the National Academy of Design and the Society of American Artists. He exhibited in the salons of Antwerp and Paris, in the Royal Academy of London, as well as in New York, Boston and Chicago. Among his best known works are: ‘Dawn’; ‘Sundown’; ‘The Stream’; ‘October Days’; ‘Morning in June’; ‘Sunrise on Lake Champlain’; ‘Cradle of the Hudson’; and ‘A Mountain Path.’

Minor, Virginia Louisa, American reformer: b. Groochland County, Va., 27 March 1824. She was educated at Charlottesville Academy (Va.), and in 1843 was married to a relative, Francis Minor, with whom she removed to St. Louis, Mo., in 1846. She was engaged in nursing the soldiers during the Civil War, and since the war has been connected with woman's suffrage movements. She was the originator of the movement in Missouri in 1866, organized an association in 1867, and was president of the convention which met in St. Louis in 1869. In 1872 she brought the question of woman's suffrage as a right before the Supreme Court of the United States, where decision was rendered against her.

Minor, in law, a person under age of legal capacity, either for any or all acts. Sometimes, as in Scotland, the word is distinguished from the term infant by being more intensive, including those under age but above 14. Usually minor is synonymous with infant (q.v.).

Minorca, mĭ-nôr'kạ (Sp. Menorca, mā-nōr'kä), an island in the Mediterranean, belonging to Spain, the second largest of the Balearic group; greatest length, northwest to southeast, 35 miles; average breadth, about 10 miles; area, 260 square miles. It is situated northeast of Majorca, from which it is separated by a strait of 27 miles broad. The coast is much indented on all sides except the south, and generally presents a succession of bold headlands, enclosing small creeks and bays, of which several form good harbors. Of these the best and most frequented is Port Mahon, the capital of the island. The coasts are rugged, and the surface broken and mountainous. Mount El Toro in the centre attains a height of about 5,000 feet. The soil is not generally fertile; still, in good seasons the quantity of wheat and barley grown is sometimes equal to the consumption. The other principal products are oil, wine, hemp, flax, oranges, and lemons. Some good cheese is made, and considerable attention is paid to the rearing of bees. There is an abundance of small game on the island. Iron, copper, lead, marble, porphyry, and alabaster abound in several districts. The inhabitants make excellent sailors, but generally are indolent, ignorant, and bigoted. At an early period Minorca was under the Carthaginians, who drew from it a number of excellent slingers, who distinguished themselves during Hannibal's wars in Italy. It afterward passed successively into the hands of the Romans, the Vandals, and the Moors. The last were expelled in 1285 by the Spaniards. During the greater part of the 18th century it belonged to the British, who finally ceded it to Spain at the Peace of Amiens (1802). Its exchange with Great Britain for Gibraltar has been frequently discussed. Pop. (1900) 38,300.

Minorca, a breed of large black and white domestic fowls. See Poultry.

Minority Representation. See Representation.

Minos, mī'nŏs, in Greek mythology, (1) a ruler of Crete, said to have been the son of Zeus and Europa. He was celebrated as a wise lawgiver and a strict lover of justice. (2) A grandson of the preceding, son of Lycastus, son of the elder Minos and of Ida. This second Minos was the husband of Pasiphaë, whose unnatural passion gave birth to the Minotaur. He was king of Crete, but is not represented as having succeeded to the kingdom, but by one tradition as having acquired it through the favor of the gods, and by another as having conquered it over his brother Sarpedon. He is said to have made war upon the Athenians to revenge the death of his son Androgeos, who was killed at the festival of the Panathenæa by the candidates whom he had defeated at the games. Minos having defeated the Athenians, exacted from them every year a tribute of seven youths and seven maidens, who were devoured by the Minotaur. Theseus delivered the Athenians from the burden of this tribute.

Minot, mī'nŏt, **Charles Sedgwick,** American scientist: b. West Roxbury, Mass., 23 Dec. 1852. He was graduated from the Massachusetts Institute of Technology in 1872, studied also at Leipsic, Paris, Würzburg, and Harvard, was lecturer on embryology and instructor in oral pathology and surgery in the Harvard Medical School in 1880–3, instructor in histology and embryology in 1883–7, assistant professor in 1887–92, and professor from 1892. He invented two forms of the microtome, an instrument for the automatic preparation of sections for microscopical study. He was elected president of the American Society of Naturalists in 1894, and president of the biological section of the American Association for the Advancement of Science in 1901. Among his works are: ‹Bibliography of Vertebrate Embryology› (1893); and ‹A Laboratory Text-Book of Embryology› (1903).

Minotaur, mĭn'ō-târ, in Grecian mythology the son of Pasiphaë and a bull, having the body of a man with the head of a bull, or the head of a man and the body of a bull. He ate human flesh, on which account Minos confined him in the labyrinth built by Dædalus, and at first exposed to him criminals, but afterward the youths and maidens yearly sent from Athens as a tribute, until at length Theseus killed him, and freed the Athenians from this tribute.

Mi'not's Ledge, or **Cohasset Rocks,** in Massachusetts, a promontory and lighthouse in Boston Harbor. See Lighthouse.

Minsk, Russia, a city and government of Lithuania, West Russia. Minsk, the city and capital of the government, is on the Svisloch, 420 miles by rail southwest of St. Petersburg. It is the see of a Greek archbishop and of a Roman Catholic bishop. It has some manufactures of woolen cloth, hats, leather, and a considerable general trade.

The government, bounded on the north and east by Vilna, Vitebsk, and Moghilen; on the south and west by Chernigov, Kieff, Volhynia, and Grodno, has an area of 35,293 square miles. Pop. about 2,500,000.

Min'ster (Anglo-Saxon, *Mynster,* from *monasterium*) anciently signified the church of a monastery or convent. In Germany and in Great Britain this title is given to several large cathedrals, as York Minster, the minster of Strasburg, etc. It is also found in the names of several places, which owe their origin or celebrity to a monastery, as Westminster, Leominster, etc.

Min'strel, a name introduced into England by the Normans, and which comprehended singers and performers of instrumental music, together with jugglers, dancers, sleight-of-hand performers, and other similar persons. See Negro Minstrels; Troubadours.

Mint, a genus of perennial herbs (*Mentha*) of the order *Labiatæ.* About 30 species have been described, of which 12 are either native or naturalized in America, characterized by square stems, opposite simple leaves, small, purple, white or pink, two-lipped axillary flowers, in whorls which often form terminal spikes. All are noted for the fragrance of their foliage, due to the presence of an essential oil, for the production of which half a dozen species are more or less cultivated. The following are the most important ones: Spearmint (*M. spicata* or *viridis*), peppermint (*M. piperita*), pennyroyal (*M. pulegium*), bergamot-mint (*M. citrata*), and Japanese mint (*M. arvensis*, var. *piperascens*). Spearmint is the species most used as a culinary herb in the form of mint sauce served mainly with roasted lamb. Peppermint is largely employed in flavoring candy and for the production of menthol. Bergamot-mint is chiefly used in perfumery. Medicinal properties have been attributed to all of them, and they have all been cultivated upon a commercial scale to supply the various demands. Besides these cultivated species, which are frequently found as escaped plants near gardens, there are several native species, of which the following are perhaps best known: Round-leaved mint (*M. rotundifolia*), which occurs rather interruptedly in the coast States from Maine to Texas; water mint (*M. aquatica*), with hairy stems, rather rare in wet places in New England and southward to Maryland; whorled mint (*M. sativa*) and its close relative, corn mint (*M. arvensis*), which are found in damp fields in New England; and wild mint (*M. canadensis*), which extends northward from the northern States across the continent. All are recognizable by their resemblance to other members of the genus, especially by their odor. Several other related plants of other genera are called mint, among them being mountain mint (*Pycnanthemum spp.*), also popularly known as basil. The numerous species are widely distributed throughout the United States and Canada, and have a mint-like flavor and odor. Catnip (*Nepeta cataria*) is often called cat mint, and several species of *Monarda*, especially *M. punctata*, are known as horse-mint.

The half-dozen cultivated mints are managed alike. They will grow on any soils that will produce good crops of potatoes, but since they are considered exhausting crops, are included in the rotation only once in five or more years. Upon reclaimed swamps, however, which are considered best adapted to their cultivation, they are generally allowed to remain consecutively for five years or even more without change of crop. The land having been plowed, harrowed and otherwise fitted, small pieces of the rootstocks are dropped at intervals of a few inches in shallow furrows about 30 inches apart. All through the season the land is kept scrupulously free from weeds, especially of smartweed, fireweed, ragweed and horseweed, which seriously injure the product if included in the "hay" from which the oil is distilled. Hand-weeding is commonly practised after horse cultivation is stopped by the luxuriant vines. About midsummer, or when the earliest flowers appear, the tops are cut, either with scythes or sometimes with mowing machines, and cured like hay. They are then stored under cover for distilling. This process is usually conducted with steam, which enters the still below, passes upward through the mass of hay, carrying the essential oil with it, and condenses in coils of pipe chilled by running water. After condensation, the oil and water separate by gravity. After standing for a greater or less length of time, crystals of menthol (q.v.) appear in the oil of peppermint. The annual yield of oil per acre sometimes exceeds 50 pounds, and sometimes a second profitable cutting of the crop may be made in autumn. Having once been planted the crop takes care of itself from year to year. The most important producing centre is in southwestern Michigan and northwestern Indiana. Perhaps next is Wayne County, New York. Other important mint fields are at Mitcham, Surrey and Lincolnshire, England, and in Saxony, Germany.

Mint, a place where money is coined by public authority. In Great Britain there was formerly a mint in almost every county. Besides the sovereign, barons, bishops, and the principal monasteries exercised the right of coining. From the time of William the Conqueror the great bulk of the coining of Great Britain was done in London, but it was not till the reign of William III. that all the provincial mints were abolished. The present mint on Tower Hill, in London, was erected between the years 1810 and 1815. The London mint supplies the whole of the coinage of the British Empire, except Australia and the East Indies, which are supplied from branch mints at Sydney, Melbourne, Perth, Calcutta, and Bombay. In France the number of mints was at one time considerable, and in the earliest times indefinite. Before the Revolution there were 27 mints, each of which had a letter or letters of the alphabet for its sign. In 1857 there were still seven French mints, namely, Paris, Bordeaux, Lille, Lyons, Marseilles, Rouen, and Strasburg. In 1858 those of Lille, Marseilles, and Rouen were abolished, and in 1860 that of Lyons, so that there were only three mints remaining in 1870, when Strasburg was taken by the Germans.

In the United States there are mints at Philadelphia, established in 1792; at San Francisco, established in 1853; at Carson City, established in 1869 (operations at this mint have been discontinued since May 1893, and probably it will never be opened again, it is now conducted merely as an assay office); at Denver, established in 1862; and at New Orleans, established in 1835. (See COINAGE.) The Bureau of the Mint was established as a division of the Treasury Department in 1873. It has charge of the coinage for the government and makes assays of precious metals for private owners. The rolling machines are four in number. The rollers are adjustable and the space between them is governed by the operator. About 200 ingots are run through per hour on each pair of rollers. When the rolling is completed the strip is about six feet long. As it is impossible to roll perfectly true it is necessary to "draw" these strips, after being softened by annealing. The drawing benches resemble long tables, with a bench on either side, at one end of which is an iron box secured to the table. In this are fastened two perpendicular steel cylinders. These are the same distance apart that the thickness of the strip is required to be. It is drawn between the cylinders, which reduces the whole to an equal thickness. These strips are now taken to the cutting machines, each of which will cut 225 planchets per minute. The press now used consists of a vertical steel punch.

From a strip worth $1,100 about $800 of planchets will be cut. These are then removed to the adjusting room, where they are adjusted. After inspection they are weighed on very accurate scales. If a planchet is too heavy, but near the weight, it is filed off at the edges; if too heavy for filing, it is thrown aside with the light ones to be re-melted. The planchets, after being adjusted, are taken to the coining and milling rooms, and are passed through the milling machine. The planchets are fed to this machine through an upright tube, and as they descend are caught on the edge of a revolving wheel and carried about a quarter of a revolution, during which the edge is compressed and forced up. By this apparatus 560 half-dimes can be milled in a minute; for large pieces the average is 120. The massive but delicate coining presses coin from 80 to 100 pieces a minute. These presses are attended by women and do their work in a perfect manner. After being stamped the coins are taken to the coiner's room. The light and heavy coins are kept separate in coining, and when delivered to the treasurer they are mixed in such proportions as to give him full weight in every delivery. By law, the deviation from the standard weight, in delivering to him, must not exceed three pennyweights in 1,000 double eagles.

Mint Geranium. See Costmary.

Min'ton, Thomas, English pottery manufacturer: b. Wyle Cop, Shrewsbury, 1765; d. 1836. He was originally an engraver having learned his art from John Turner, who had paid special attention to the process of printing on delft or chinaware. He settled at Stoke upon Trent in 1791 and founded a pottery factory with the object of producing glazed pottery in the highest style, which should compete with the productions of foreign countries. He was completely successful and the range of his manufacturers was increased by his son Herbert Minton, who succeeded him in 1836, and manufactured the famous «Parian» porcelain and the encaustic tiles, with which the name Minton is now most commonly associated.

Min'uet, a French dance, in slow time, which requires great grace and dignity of carriage. It was the favorite dance in the time of Louis XIV. The name is also given to a piece of music written for such a dance in triple time.

Minuit, mĭn'ū-ĭt, **Minuits,** or **Minneuit,** mĭn'ĕ-wĭt, **Peter,** German colonist in America: b. Wesel, Rhenish Prussia, about 1580; d. Fort Christina, New Sweden (Delaware), 1641. He was an official in America in the service first of the Dutch West India company and then of the Swedish West India company. Appointed governor of New Netherlands by the Dutch West India company on 19 Dec. 1625, he landed on Manhattan Island on 4 May 1626, purchased the island from the Indians for trinkets valued at approximately $24, built Fort Amsterdam, and governed with a great degree of success until his recall in August 1631. In 1633 the charter of the Swedish West India company, originally granted in 1626, was renewed, and in 1637 Minuit, under the direction of the company, set sail from Gothenburg with 50 Swedish and Finnish colonists to found a colony in North America. He arrived at Delaware Bay in April 1638, purchased from the Indians the territory between the falls of the Delaware at Trenton and Cape Henlopen, called this region New Sweden, and built Fort Christina. This colony was taken by the Dutch in 1655.

Minulúan, mē-noo-loo'ăn, Philippines, a pueblo of Negros Occidental on Guimaras Strait, 5 miles north of Bacólod, the provincial capital. Pop. 11,340.

Minute, a division of time and of angular measure; the 60th part of an hour, and the 60th part of a degree. In astronomical works minutes of time are denoted by the initial letter *m,* and minutes of a degree or of angular space, by an acute accent (′).

Minute Men, in the American Revolutionary War, the militia, who were prepared for service at a minute's notice. They were principally civilians, resident in Massachusetts, who were enrolled in accordance with an act of the Provincial Congress, passed 23 Nov. 1774. There were in Boston alone 16,000 minute men ready for service.

Minyas, mĭn'ĭ-ạs, in Greek mythology, the son of Chryses, the hero of the *Minyæ,* from whom were descended most of the Argonauts. His three daughters, Clymene, Iris, and Alcithoë, or Leuconoë, Leucippe, Alcithoë, were changed into bats for having made light of the mysteries of Dionysus.

Mi'ocene Period, in geology, the middle period of the Tertiary era, intermediate between the older Eocene and the newer Pliocene. Considered in respect to its invertebrate (fossil) fauna the earlier part of it («lower» Miocene) forms a part of the Oligocene (q.v.); but no such distinction can be made when the period is judged by its vertebrate remains. See Tertiary Era.

Miohip'pus, a fossil horse of later Miocene time. See Horse, Evolution of.

Miquelon, mēk-lôṅ, an island in the Atlantic Ocean, near the southern coast of Newfoundland, at the entrance of Fortune Bay, with St. Pierre (q.v.) forming a French colony. The southern part of it is called Little Miquelon (*Petite Miquelon*) or Langley Island, and was once a separate island, but since 1783 has been connected with it by a sand-bank. The island has been in the possession of the French since 1763. It is under the direction of the commandant of St. Pierre and is occupied only by a few families engaged in the fisheries. The area of Miquelon is 83 square miles; pop. about 600.

Mir, mēr, in Russia, a name given a commune, consisting of the inhabitants of one or more villages, who are as a community owners of the surrounding land.

Mira, mī'rạ or mē'rạ, or **Stella Mira** (the wonderful star), in astronomy, the star Omicron Ceti, a remarkable variable, situated in the neck of «the whale.» Its variability was discovered in 1596 by Fabricus. The period is somewhat irregular, but averages about 331 days. During the greater part of this time the star remains of about the 9th magnitude, but during about 100 days it rises to a maximum which may vary from the 2d to the 5th magnitude, remains for a week or 10 days there, and then sinks to its minimum again. When shining with a brightness of the 2d magnitude, it is giving out more than 600 times as much light as when at the 9th magnitude.

Mirabeau, Gabriel Honore Riquetti, gă-brē-ĕl ō-nō-rā rē-kĕt-tē mē-rä-bō, or mĭr'ă-bō, Comte de, French orator and Revolutionary leader: b. Bignon, near Nemours, 9 March 1749; d. Paris 2 April 1791. In 1767 he entered the Berry cavalry regiment, was promoted 2d lieutenant, but on account of misconduct was later imprisoned on the island of Ré until March 1769. He then joined the expedition to Corsica, in 1771 was commissioned captain of dragoons, and in 1773 was married. In 1774 he was imprisoned in the Castle of If, owing to debts and quarrels with his wife and father, and the next year was transferred to the Castle of Joux, near Pontarlier. Here he fell in love with the young wife of the Marquis de Monnier; trouble ensued and Mirabeau finally escaped to Switzerland, where he was joined by his mistress, Sophie, as he called her, and in October 1776 they settled in Amsterdam. In May 1777, however, they were arrested, brought to Paris, and Mirabeau was imprisoned for three years and a half at Vincennes, being released in December 1780. After Mirabeau had forsaken her, Sophie committed suicide in 1789. Having secured the revocation of the death sentence imposed upon him for the seduction of Sophie, and being legally separated (1783) from his wife, he left France for a few months. Upon his return he began his life-long intimacy with Henrietta van Haren, known as Madame de Nebra, whose influence was undoubtedly exerted to his great benefit. In August 1784 he was forced to flee to London to allow more trouble to blow over, and while there wrote the 'Considérations sur l'ordre de Cincinnatus.' About 1784 he began to devote himself to politics, visited London, was entrusted by Calonne with a secret mission to Prussia, and published various treatises, which made him sufficiently well known to the *tiers état* to be elected by the town of Aix to be its representative in the States-General of 1789. Here he speedily eclipsed all the other orators of the Assembly, and became the centre round which gathered all the men of greatest mark and force of character in the third estate. He was the immediate cause of the French Revolution, by the resistance which he offered to the demand of the king after the royal sitting of 23 June 1789, that the third estate should vote separately from the other two orders. It was on this occasion that he gave the vigorous reply to the grand-master of ceremonies, who had communicated to the Assembly the royal will, concluding with the words, "Go and tell your master that we are here by the will of the people, and that no one shall drive us out except by the force of bayonets." Both before and after this occasion he delivered many eloquent speeches, which obtained for him the title of the "French Demosthenes." Among the most remarkable of these are his address to the king demanding the removal of the troops encamped at Versailles, speeches on the national bankruptcy, on the civil constitution of the clergy, on the royal sanction, on the right of peace and war, and his reply to the Abbé Maury on ecclesiastical property. After having shown himself a bold reformer, and the most dangerous adversary of the court, Mirabeau ended by offering his support to the throne, although he continued to make a show of opposition to royalty in order to uphold his popularity. This state of matters dates from May 1790. It appears to be true that in this change of position he acted from conviction, foreseeing the imminence of a great catastrophe, which he desired if possible to avert. Whatever may have been his motives, this conduct, when it became known, naturally raised up against him numerous enemies. But on 30 November he was elected president of the Jacobin Club, and on 29 Jan. 1791 of the National Assembly. His remains were buried with great pomp in Sainte-Geneviève Church (the Pantheon), but three years later they were exhumed to make room for those of Marat. Consult: 'Mémoires biographiques, littéraires et politiques de Mirabeau,' by his adopted son, Lucas de Montigny (1834-5); and 'Correspondance entre le Comte de Mirabeau et le Comte de la Marck pendant les années 1789-91' (1851). Other important works on Mirabeau are: Mérilhou, 'Essai sur la Vie et les Ouvrages de Mirabeau' (1827); Reynald, 'Mirabeau et La Constituante' (1872); Louis and Charles de Loménie, 'Les Mirabeau' (1878 and 1889); Aulard, 'Mirabeau' (1882); A. Stern, 'Das Leben Mirabeaus' (1889; Fr. trans. 1895); Mézières, 'Vie de Mirabeau' (1892); Carlyle, 'French Revolution,' and 'Essays on Mirabeau'; Willert, 'Mirabeau' (1898).

Miracle Plays. The earliest dramatic representations of religious themes grew up within the Church itself. At certain seasons of the year, tableaux of gospel scenes were shown to the people, a practice which still survives in the representations of the Nativity in modern Catholic churches. The introduction of action and music into these tableaux is easy to understand, particularly in view of the dramatic elements in the celebration of the Mass, and in the ritual for special occasions, like the consecration of a church. Simple Latin words were next set to the music accompanying a given scene, and this text was called a *trope*. In time these tropes grew more elaborate, passages in the vernacular were introduced, and popular elements not taken from the Bible were added. Meanwhile, the little plays, which in the beginning had been given in the choir, were transferred to the nave, and set up against the pillars. So popular did these representations become, and so great was the concourse of spectators, that a move outside the building into the churchyard had to be made. Secular elements crept in very rapidly, and the plays were finally transferred to open spaces in the cities and towns. The liturgical drama reached its height in the 13th century; by the beginning of the 14th century it had largely passed out of the hands of the clergy, although representations continued to be given in many churches.

The growth of the miracle play in England is due to the influence of the Normans. There are almost no evidences of dramatic impulse in England before the Conquest. The earliest play of which there is mention by name is a 'Play of Saint Katherine,' at the beginning of the 12th century, produced under the direction of a Frenchman who afterwards became Abbot of Saint Albans. To the same century belongs the work of Hilarius, a pupil of Abelard, and perhaps of English birth. He wrote Latin plays on subjects taken from the Scriptures, and diversified them with refrains in Old French. It seems probable that French plays may have been acted in England at this time, but none are extant.

The term «miracle play» is properly applied to the religious plays which developed in England out of liturgical beginnings. They have sometimes been called «mysteries,» but this term, which is more generally and rightly used of productions in France, does not antedate the 18th century in England, the mediæval name being *miraculum,* or *miracle*. A great impetus was given to the plays by the institution of Corpus Christi Day, with its elaborate processions and outdoor ceremonial, and many came to be presented at this season, when the conditions of weather were likely to be favorable. In time the procession served as a mere preliminary to the dramatic performances to follow. A desire for more elaborate stage effects and a greater number of incidents within the plays was constantly increasing, until there developed out of the relatively simple early pieces long groups of plays of cyclic character, covering the principal events of the Scripture narrative, in both the Old and the New Testament. The series given at York in 1415 begins with the Creation, and ends with the glorification of Mary and Jesus in heaven, embracing 48 separate pieces in all. These cycles were often not all given on one day, but extended over two or more days, or they were divided, and presented in succeeding years.

After leaving the churches, the plays soon passed into the hands of the guilds, or associations of tradesmen. In the 13th century clerics were forbidden by Papal edict to appear on the stage, but these prohibitions were frequently disregarded. The control of the plays by the guilds marks a period of great importance in the history of the English drama. Much care was devoted to the production and acting of the various pieces. The corporation of the city had general charge of the matter, deciding when the performances should be given, and dividing the various scenes among the several companies. An effort was made to have the play suit the character of the guild that gave it; the shipwrights showed the building of the Ark, the watermen the Flood, and so forth. The plays were given on movable stages called *pageants,* which consisted of «high scaffoldes with two rowmes,» one beneath which was used as a dressing room, and one above, open on all sides to give a better view, and occasionally provided with a canopy. These wagons moved from place to place, repeating the performance at different stations. The number of these stations varied with the size of the town; there were sometimes a dozen or more. The pageant wagons were gaily painted and decorated. They were generally rectangular, but special shapes were required for the Ark, or for Hell-Mouth. a huge painted head with open jaws belching fire and smoke. The scenery was of a rude sort. Palaces, temples, and castles were sometimes represented by boxes or wickerwork covered with cloth. Occasionally the actors made use of the open space in front of the pageant; Herod's «raging» appears to have been partly done in the street. The costumes were often expensive, but frequently grotesque. Herod was attired like a Saracen, with red gloves. Pilate always wore a green cloak, and wielded a huge club. God the Father was represented in person, and dressed all in white, with a gilt wig. The devils and the Evil One were made very realistic, and came to furnish a great deal of low comedy. Various accounts of sums paid for properties and costumes are still preserved.

Four cycles of miracle plays are still extant, the York, Chester, Coventry, and Towneley or Woodkirk plays. The Towneley series, so called from the family who long owned the manuscript, much resembles the York cycle, and like it displays much vigor and humor. The Chester plays perhaps appeal most to modern taste. The religious passages are more reverent, the humor less coarse, and the versification less harsh. The Coventry plays are full of didacticism, and this, with the introduction of personified abstractions, relates them more closely than the others to the Moralities. Fragments of other cycles have also survived. The Vulgate and the Apocrypha are the chief sources of the text. In places some tragic elevation is reached, marred, however, by repetition and moralizing. Melodramatic and ranting scenes were popular. The comic scenes are often very spirited, and clearly based upon observation of the life of the people. Anachronisms are common, and the supernatural is treated with great naïveté.

The miracle plays were at their best in the time of Chaucer. In the 15th century the Moralities arose to compete with them for favor, but never equalled them in dramatic achievement. The miracle plays continued to be given until the beginning of the 16th century, but in the reign of Elizabeth they had ceased to be a vital force. Their influence in preparing the way for the Elizabethan drama was very great, however. They introduced elementary types of comedy and tragedy, farce and melodrama, and accustomed the people as a whole to dramatic conventions. They made a national drama possible in the time of Shakspere, and kept the theatre from being a mere amusement for the nobility, or a diversion for a small group of literary people.

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Miracles, works which excite wonder, because they are beyond ordinary human experience and appear to contravene the known laws of nature.

The well-known argument of Hume against the credibility of a miracle has often been refuted. A miracle, he said, was contrary to experience, but false witnesses in history are not contrary to experience; it is less probable that the miracle is true than that the witness is false. There are two fallacies in this reasoning; it begs the question by the use of the words contrary to experience, for the point at issue is whether miracles are contrary to experience or no. If they are contrary to Mr. Hume's experience may it not be because his experience is limited? He has not lived at an age when a new religion was instituted, and extraordinary guarantees demanded in order to accredit it with a hostile world. Even mankind's experience in nature is becoming widened every year and many wonderful things take place at this moment which our ancestors of a century ago would have looked upon as magical or miraculous, such as the wireless telegraphy, communication, by telephone, the effects of the Roentgen rays, the power of radium, etc. For miracles are not to be looked upon as a violation of the laws of nature, but merely as the interposition of a higher law overruling a lower one. To those who believe in an intelligent creator and conserver of the world there can be no difficulty in apprehending the possibility of the miraculous; even those who like Herbert Spencer have a vague belief in what they style Force or Power underlying all the operations of nature, should not hesitate in admitting that the force which keeps up the multitudinous activities of the universe may manifest itself at times in unprecedented fashions, even as the new discoveries and combinations of science are constantly revealing new powers in the domain of natural law.

Pascal has said that the certainty and genuineness of certain miracles is proved by the falsity of others, meaning, presumably that the very fact that general human consent has been given to the idea of miracles proves that such idea has a counterpart in reality. There are of course certain concomitant circumstances which may be taken as affecting the credibility of a miracle. Most of the miracles of history may be put aside as inventions, such are many of the stories told by Livy and Herodotus, and the wild fables of Hindu history, as well as many miraculous incidents in the life of Mohammed. Christian apologists lay particular emphasis on the moral aspects of the miracle. To those who deny or doubt the existence of a supreme being, the moral ruler of the universe, a miracle is an impossibility. On the other hand, without miracles the revelation of God is impossible. Hence, a miracle with a moral object is most in accordance with the character of a Supreme Being governing the world with a moral end. All idle or superfluous miracles are to be rejected as at variance with the character of such a being. Equally to be rejected are miracles which are merely tentative, that is, sometimes successfully accomplished, sometimes ending in failure; as well as others which are doubtful in their nature, and those which are merely exaggerations of natural events.

In the early church those who defended Christianity against the attacks of those outside laid great stress on the evidence of miracles, and claimed that miraculous power still existed among Christians. Irenæus asserted that this power was universal among Christian churches. St. Augustine asserts the reality of the miraculous on the testimony of his own experience. He makes the acute remark that a miracle is not contrary to nature but to what we know of nature. The schoolmen did not agree with Augustine on this point. Thomas Aquinas defines a miracle as «something out of the order of nature.» Albertus Magnus declares that God has implanted the possibility of miracles in the very nature of things, although denying that he can do anything contrary to nature. Luther puts the miracle of grace in the heart far above any physical miracle, while he assigned the Bible miracles their proper place in the development of the faith. The Roman Catholic Church has always claimed the possession of miraculous powers and continues to do so to this day. The Socinians and Arminians maintain that God has always revealed himself by means of supernatural works, and Grotius in his defense of Christianity makes miracles the foundation of his argument. There has always, however, been a school of rationalists or philosophers who have opposed or attacked the belief in miracles, although Leibnitz admitted this belief into his philosophical system. He defines a miracle as an event inexplicable by natural causes. The laws of nature, he says, are not necessary and eternal; God can for his own purpose suspend them; the miraculous is included in the divine plan, and forms a part of «the pre-established harmony.» Spinoza made the statement that miracles are impossible. In his pantheistic philosophy nature and her laws are identical with the will, intelligence and nature of God who cannot work contrary to the laws of material nature. Kant like the English Deists did not deny the possibility of miracles, for they might be wrought by powers and in accordance with laws of nature with which we are unacquainted, but believed that such laws were never exercised. Schleirmacher contests the apologetic value of miracles, and endeavors to eliminate the miraculous from the Christian scheme, which he thinks is lowered by this supernatural element. The modern agnostic claims that the advance of science has made a belief in the miraculous impossible. Some have tried to explain the recorded miracles of Scripture by a reference to natural causes; others would treat them as allegories or attribute them to self-deception, or fraud, or the credulous exaggeration of the bystanders and witnesses. But miracles form an essential part in Christianity, and cannot be either explained away or eliminated without destroying its authority. Consult: Duke of Argyll, 'Reign of Law' (1866); McCosh, 'The Supernatural in Relation to the Natural' (1862); Trench, 'Miracles of our Lord' (1884); Balfour, 'The Foundations of Belief' (1895); Pfleiderer, 'Philosophy and Development of Religion' (1894).

Mirage, mĭ-räzh', the name given to certain illusory appearances due to the bending of rays of light in the atmosphere. The earliest attempt to explain the mirage seems to be that of Monge, who accompanied Bonaparte's Egyptian expedition; he thus describes what was observed by the French soldiers: «The villages seen in the distance appeared to be built upon an island in the midst of a lake. As the observer approached them the boundary of the apparent water retreated, and on nearing the village it disappeared, to recommence for the next village»; he attributed the phenomenon to the hot sand of the desert keeping the lower layers of the atmosphere at a less density than the upper ones; the rays of light from the lower parts of the sky and objects in the distance arrive at the surface separating the less dense layer of air from those above, and are there subjected to total reflection; the eye sees the sky in the direction of the received rays, and this gives rise to the idea of a lake.

It is often assumed that rays of light pass through the atmosphere in straight lines; this is approximately true for short distances, but astronomers and surveyors have to correct their observations for refraction. By the laws of optics it is easy to see why a ray passing obliquely through the atmosphere, when this is arranged in horizontal layers of equal density (those of greater density being lowest), should bend, and that a vertical ray should not bend; but optics does not tell us why a horizontal ray is much more refracted than an oblique one. The explanation (first given by Dr. James Thomson) is easy on the undulatory theory of light. The wave front of a horizontal ray of light is at right angles to the ray, and is a vertical plane; now light is less rapidly propagated in the lower layers of air, hence the lower part of the wave front is retarded, and when the light has proceeded some distance its wave front is no longer vertical, and the ray has bent downward (the ray is always supposed to be normal to the wave front). Thus, in the atmosphere in its normal state the path of a ray of light is always slightly concave downward. Professor Everett thus explains the appearance of "castles, obelisks, and spires," cities with many buildings, forests of naked trees, and great basaltic precipices sometimes assumed by irregularities in cakes and fields of ice. It sometimes happens that several inverted images of an object are seen in the same sky; these may be accounted for by assuming that there are several layers of air, in each of which there is a rapid variation (an increase upward) of the index of refraction. Mirages are not uncommon in California, Nevada and Alaska.

Miramar, mē-rä-mär′, a celebrated palace on the shore of the Adriatic near Grignano, 6 miles from Trieste, the home of the Archduke Maximilian, afterward emperor of Mexico.

Miramichi, mĭr″ạ-mĭ-shē′, Canada, a river of New Brunswick formed by the junction of the northwest and southwest Miramichi, about 35 miles above its mouth in Miramichi Bay on the Gulf of Saint Lawrence. The northwest affluent rises in the highlands east of the Nepisiquit, and is about 90 miles long, 16 miles of which are influenced by the tides. The southwest or main headstream flows from a lake near the Tobique, and fed by numerous rivulets draining a lake district, becomes a considerable river 185 miles long to its confluence with the northwest branch. The Miramichi is navigable for large vessels two miles above Newcastle, the principal town on its banks. Salmon, trout and other varieties of fish abound in the river and its tributaries, and on one of the latter, Stewart's Brook, there is a government fish-breeding establishment.

Miramon, Miguel, mē-gĕl′ mē-rä-mōn′, Mexican soldier: b. City of Mexico 29 Sept. 1832; d. Querétaro 19 June 1867. He was educated in the military school of Chapultepec in 1846; was a volunteer in the war with the United States; became a colonel in the Mexican army; deserted with his regiment to take part in the revolt at Puebla in 1856; and for that was degraded when Puebla was taken by Comonfort. In October 1856 he headed another revolt at Puebla, in 1856–8 was conspicuous in the party of the reactionists, and was chosen by the electoral junta to succeed Zuloaga as president 2 Jan. 1859 (entered office 2 February). He continued to take part in the "war of reform" in 1859–60, but was defeated at Calpulalpam, near Mexico, 22 Dec. 1860, by Ortega, and fled to the coast, sailed to Europe, and probably was concerned in the plans of Napoleon III. for an invasion of Mexico. Maximilian appointed him grand-marshal and minister to Berlin. Later, he was given a high command in the imperial army, and conducted with Maximilian the defense of Querétaro. He was captured on the surrender of the city, and shot with the emperor.

Miranda, mē-rän′dä, **Francisco Antonio Gabriel,** Venezuelan revolutionist: b. Caracas 9 June 1756; d. Cadiz, Spain, 14 July 1816. In 1773-82 he was an officer in the Spanish army, then served with the French allies in the colonies in the Revolutionary War (1779, 1781), and was a general of division in the French republican army (1790–3). He began a scheme for obtaining the independence of Spanish South America, founded the important society Gran Reunión Americana, which included many names later prominent in the South American revolution, and in 1806 made a futile attack on the Venezuelan coast. In 1810, on the breaking out of the revolution in Venezuela, he returned, in 1812 was made dictator, but on 25 July capitulated to the royalists. He was sent to Spain, and there remained a prisoner. Consult: Briggs, 'History of Don F. Miranda's Attempt to Effect a Revolution in South America' (1809); Baralt, 'Historia de Venezuela' (1841).

Mir′iam, the sister of Moses (q.v.) and the eldest of the family, is first mentioned as being stationed by her mother to watch her brother's cradle among the sedges on the river's brink. Later she procured her mother as nurse for the child when found by the princess. After crossing the Red Sea she is mentioned as "Miriam the Prophetess," and she takes the lead with Aaron in the complaint against Moses for his marriage with a Cushite. For this action she was stricken with leprosy, but later the curse was removed, and she died toward the close of the wandering in the desert. She was buried in Cadesh.

Mirror, a smooth surface usually of glass, capable of regularly reflecting rays of light. A mirror may be (1) a polished surface of glass; (2) a surface of tin-foil on the further side of a sheet of glass (as in the common looking-glass); (3) the surface of a deposited film of silver or platinum on a polished glass surface, so that rays of light to and from the metallic reflecting surface do not pass through the glass; (4) a polished surface of silver, gold, platinum, or speculum metal (a bronze composed of about 32 parts of copper to 15 of tin, small quantities of lead, antimony, and arsenic being sometimes added).

Looking-glasses date from the 12th century; they were a great improvement on the more ancient speculum metal mirrors, whose reflecting surfaces were liable to oxidation from exposure to the air, but they have the disadvantage that there are two reflecting surfaces, one of glass, the other of metal. Polished metals reflect nearly all rays of light at all incidences; glass reflects very few rays at the normal incidence, but the amount of reflection becomes greater and greater as the incidence becomes more and more oblique. Mirrors are usually either «plane» or «spherical.» Spherical mirrors are small portions of the surface of a sphere. In a spherical mirror, concave or convex, the line through the centre of the spherical surface of which the mirror is a part and the middle point of the mirror is called «the axis.» From a concave mirror rays parallel to the axis converge after reflection to a point called the «principal focus,» which is half-way between the centre of the sphere and the mirror. (See Light.) Rays from a luminous object outside the spherical centre of a concave mirror form a small, real, inverted image of the object between the centre and the principal focus; when the object is between the centre and the principal focus the image is beyond the centre, and is large, real, and inverted.

Prior to 1835 mirrors were almost universally made by applying a coat of tin-foil amalgamated with mercury to the surface of plate-glass. In 1835 Baron Liebig observed that on heating aldehyde with an ammoniacal solution of nitrate of silver in a glass vessel, a brilliant deposit of metallic silver was formed on the surface of the glass. To this observation the more recent process of silvering glass is really due. In 1849 Drayton made known a method in which he employed as a backing composition two ounces of nitrate of silver, one ounce of ammonia, three ounces of alcohol, and three ounces of water. The defects of these two modern processes are that the deposit of silver on glass is not so adherent and unalterable under the influence of sunlight and sulphurous fumes as the old amalgam of tin and mercury; besides, the newer processes give the glass a slightly yellowish tinge. These disadvantages have been obviated by applying to the silver coating a weak solution of cyanide of mercury, which immediately forms a kind of amalgam, and renders the deposit at once much whiter and more adherent. The silvering is protected from mechanical abrasion and the chemical action of gases and vapors by a coating of shellac or copal varnish, which when dry may receive a further covering of red-lead paint. A method of coating glass with platinum has been recently introduced. A solution of bichloride of platinum is spread over the surface of the glass with a fine brush, and the metal is precipitated with oil of lavender. As this summary process produces a somewhat gray lustre it is used only for cheap mirrors, the lids of ornamental boxes, toys, and the like.

Mirror Carp. See Carp.

Mirror for Magistrates, The. This once popular work, the first part of which was published in 1555, and the last in 1620, was the result of the labors of at least 16 persons, the youngest of whom was not born when the oldest died. It probably owed its inception to George Ferrers, Master of the King's Revels at the close of the reign of Henry VIII.; and he associated with himself William Baldwin. Richard Niccols is responsible for the book in its final state; and in the interim, it was contributed to by Thomas Newton, John Higgins, Thomas Blennerhasset, Thomas Chaloner, Thomas Sackville, Master Cavyll, Thomas Phaer, John Skelton, John Dolman, Francis Segar, Francis Wingley, Thomas Churchyard, and Michael Drayton. It is a «true Chronicle Historie of the untimely falles of such unfortunate princes and men of note, as have happened since the first entrance of Brute into this Iland, until this our latter age.» It was patterned after Lydgate's 'Fall of Princes,' a version of Boccaccio's poems on the calamities of illustrious men, which had been very popular in England. The stories are told in rhyme, each author taking upon himself the character of the «miserable person» represented, and speaking in the first person. The first one told by Ferrers is that of Robert Tresilian, chief justice of England.

Mirza, mėr'zạ, Persian title, equivalent to «Prince.»

Mirzapur, mēr-zä-poor', India, a city and district of the Benares division of the United Provinces of Agra. Mirzapur, signifying the Prince's Town, the capital of the district, is on the right bank of the Ganges, 56 miles by rail southeast of Allahabad. It presents an imposing appearance from the river, with fine ghats leading down to it, and numerous mosques, temples, and handsome European houses occupying some of the most conspicuous sites, but the interior is disappointing. It has the largest mart in Upper India for grain, cotton, and other raw produce, but with the railway era and the rise of Cawnpore to commercial importance, much of its trade has migrated elsewhere. Shellac, brassware, and carpets are manufactured. There are imports of grain, sugar, cloth, metals, fruit, spices, tobacco, lac, salt, and cotton; and exports of the same articles with manufactured lac-dye, shellac, and ghee butter. The military cantonment is three miles northeast of the town, on a peninsula formed by the windings of the Ganges. Pop. about 83,000. The district has an area of 5,224 square miles, and a population of about 1,200,000, chiefly Hindus. The chief products are wheat, barley, cotton, oil-seeds, and fruits.

Misamis, mē-sä'mĭs, Philippines, a province of the island of Mindanao, situated on the north central coast, bounded on the east by Surigao; area, 3,406 square miles, with dependent islands, 3,521 square miles. The province is crossed by two mountain ranges, one on the east side with summits of 5,000 feet elevation, and the other on the west side with a peak that rises 5,427 feet. It has a number of rivers, and is crossed by the Grande de Mindanao, or Pulangui, which rises in the northeast; Lake Lanao also extends over the southern boundary within its limits. The staple agricultural products are hemp, chocolate, coffee, cotton, sugar, rice, tobacco, corn, and sweet potatoes; the forests contain woods valuable for building as well as resinous trees. The chief industry is the manufacture of fabrics used for dress for home consumption and sacks for packing purposes. There are no good roads of any importance; the inland towns and villages are reached by river or trail, and the trade between coast towns is by native craft. Civil government was extended to the province in 1901; the population is mostly Visayan, with some Moros in the western part; the provincial governor reported in December, 1901, that the tranquillity of normal times was restored, with rarely some depredation from the Moros of Lake Lanao. Pop. 126,950.

Mischianza, mĭs-kẹ-än'tsạ, **The**, in American history, an entertainment given in Philadelphia, 18 May 1778, during the War of the Revolution, by officers of the British army, in honor of Sir William Howe. The entertainment was given at the country home of Thomas Wharton and comprised a dinner, dancing, a regatta, mock tournaments and various games. Major André was prominent in planning the entertainment.

Misdemeanor, in law, any offense below felony; the least offense by English common law. In the United States, the different States vary widely in defining misdemeanor, so that what is misdemeanor in one State may be indictable felony in another. Among the offenses commonly classed under this heading are malicious mischief, assault and battery, etc.; criminal proceeding on such charges may be dropped, in many States, if the injured party acknowledge satisfaction, which suggests a distinction between felony. The historic line between the two classes of offenses was based on the outcome of conviction; in the case of felony the convicted person forfeited his property, real and personal, if the felony was capital, personal only if the felony was not capital. But no forfeiture of property ensued upon conviction for misdemeanor.

Miseno, mē-sä'nō, **Cape,** Italy, a promontory forming the west side of the Bay of Pozzuoli (ancient Cumæ), 10 miles southwest of Naples. On it are the ruins of the ancient city of Misenum, destroyed by the Saracens, 890 A.D., which Augustus made one of the principal naval stations of the Romans.

Miserere, mĭz-e̤-rē'rē (Latin, «have mercy»), the name by which the 50th psalm in the Vulgate (or Latin version) is known, corresponding to the 51st of the English version. The *Miserere* forms part of certain liturgies, and various great composers have taken it as a subject. The *Miserere* of Allegri is particularly famous.

Misericor'dia, or Misericorde', a narrow-bladed Italian dagger used in giving the *coup de grâce* or finishing stroke to a wounded foe. Also the name of a society in Florence, founded in the 13th century, who tend the poor sick, carry victims of accidents or disease to the hospitals, and the dead to their burial.

Mishna, mĭsh'nạ, the first part or text of the Talmud, the second part or Gamara (supplement) consisting of a commentary on or elucidation of the Mishna, which consists of oral traditions and glosses on the Pentateuch, made in Galilee by the Rabbi Jehudah or Judah Hakkodesh, who completed the work 220 A.D. A commentary was rendered necessary by the extreme terseness and conciseness of style with which the Mishna is composed. It is written in Hebrew, but it contains a number of Greek, Latin, and Aramaic words, which had become naturalized in the Hebrew, and bears traces also of Aramaic idiom. The traditions set down in the Mishna were held by the Pharisees to be of equal authority with the written law of Moses, and were supposed to constitute an oral law delivered to Moses by God and by Moses delivered to Joshua, by Joshua to the elders, by the elders to the prophets, and by the prophets to the men of the Great Synagogue. Such is the statement of the Mishna itself, which the Pharisees accepted. The Sadducees, however, rejected this doctrine, although in many cases they followed in practice «the traditions of the elders» with much fidelity. See JUDAISM — *The Talmud.*

Misiones, mē-sē-ō'nēs, Argentine Republic, a territory bounded on the north by Brazil, on the east by the rivers San Antonio and Pepiri or Pepiri-Guazu, separating it from Brazil, on the south by Brazil, and on the west by the province of Corrientes and Paraguay. Area, 11,282 square miles. Three low mountain chains radiate from the centre, and the greater portion of the surface is covered with forest, producing building and dye-woods, oranges, medicinal herbs, and the *yerba maté.* Maize is largely grown and sugarcane to some extent, and several sugar-mills are in operation. Posadas, the capital, on the Parana was founded in 1865. The territory has a population of 4,000.

Miskolcz, mĭsh'kōlts, Hungary, capital of the comitat of Borsod, 24 miles northeast of Erlau. The inhabitants are chiefly employed in the cultivation of cereals and the vine, and there is an important trade in wine, corn, leather, stone, etc. Among the churches is a Gothic one of the 13th century, and it has also a fine hospital, several gymnasia and other educational institutions, and a theatre.

Misrep"resenta'tion, in law, any act, whether verbal or tacit, tending to create or creating a false impression on another, such that by acting upon this impression he is injured. Misrepresentation falls under two heads, deliberate and unwitting. Deliberate misrepresentation is either deceit (q.v.) or fraud (q.v.). Unwitting misrepresentation is legal mistake (q.v.), and its treatment by the law depends largely on circumstances, but is unfortunately too much influenced by the principle that «ignorance does not excuse,» which should strictly be confined to the application suggested by its original form, «ignorance of the law» (q.v.).

Mis'sal (Latin *missale,* from *missa,* mass), the book which contains the prayers, rubrics, antiphons, etc., of the mass. It was formed by comprising in one volume the separate books formerly used in different parts of the service, namely, the Oratorium, Lectionarium, Evangeliarium, Antiphonarium, the Canon, etc., for the convenience of the priest. Variations and corruptions in the course of time crept into the text of the Missal, and the Council of Trent suggested a revision of it. This was accordingly accomplished by order of Pius V. (1570), who required the new Missal to be used by the whole church, with the exception of those societies which for more than two centuries had followed another ritual. Subsequent revisions made under Pope Clement VIII. (1604) and Urban VIII. (1634) extended little beyond alterations of single expressions, and the addition of new masses. In the ancient and mediæval church there were many varieties of Missal having only a local use. Thus, in England there were missals of the Sarum use, Hereford use, Lincoln use, Bangor use, etc. There are also missals of the Greek Church, the Church of the Maronites, and other Christian sects. The earliest printed missal is the 'Missale per totius Anni Circulum More Ambrosiano compositum' (Milan, 1475, folio), which was followed by the 'Missale secundum Consuetudinem Romanæ Curiæ' (Rome, 1475).

Mission Indians, a general name given the Indians of southern California who in the 18th century were christianized by the Spanish Francisian missionaries. The Mission Indians were originally of many tribal families and dialects, but chief among them were the Yumas and the Shoshones. Father Junipero Serra (q.v.) and the other friars who followed him succeeded in gathering the Indians into communities, mission houses and chapels were built and vineyards planted. The work began about 1776 and continued successfully until 1831. In this latter year they numbered 19,000, but with the overthrow of the Spanish power by the Mexicans a period of confiscation and destruction began, which continued to 1840. The friars were banished, the mission abandoned and the Indians driven back to the deserts and the mountains. Under the American rule in California, both Indians and missions were neglected until after the Civil War, when the government took steps to care for the unfortunate natives. They now occupy about 30 small reservations, which in the aggregate contain 180,000 acres. The remaining Indians number about 2,600. They are partly civilized and fairly industrious. Within recent years an organization in Los Angeles has been endeavoring to rebuild the ruined missions and preserve them in remembrance of a historic past.

Missionary Ridge. See CHATTANOOGA, BATTLE OF.

Missionary Society, Methodist. See METHODIST EPISCOPAL CHURCH.

Missions, Protestant Foreign. Foreign missions were not seriously undertaken by Protestants until more than 200 years after the Reformation. This curious fact is sufficiently explained by the circumstance that the reformers were involved at the outset in a struggle, not only for liberty but for life itself; that Christendom did not yet control the whole of Europe; an aggressive Mohammedan power with its foot in Hungary and its fleets in the Mediterranean being still active in its purpose of conquest; and that the State alone commanded resources sufficient for enterprises of any kind in remote regions like the Indies, Africa, or America. These circumstances of life in Europe in the 16th century materially lessen the importance of the question whether Luther and his followers did or did not see that a Christian Church must die which is not actively missionary in principle.

The first Protestant missions, perhaps naturally, were state enterprises, unless we reckon as a mission the single effort of Heiling (1634) in Abyssinia, which ended with his murder 20 years later. In 1556 the Council of Geneva sent missionaries to Brazil with Coligny's colony, who perished with the colonists. In 1635 the Duke of Gotha sent a mission to Persia, and in 1663 again a mission to Abyssinia; both unpractical embassies were quickly forgotten. The Dutch Government, after gaining possession of the East-Indian archipelago in 1602, made a serious effort to Christianize the Malays, and the people of Ceylon and of Formosa, producing permanent results in Java and the adjacent islands of the East Indian Archipelago only. The Dutch Government published in 1685 the New Testament in Malay (the second of modern translations of Scripture into heathen languages; Eliot's translation into Mohican in 1663 having been the first), and the whole Bible in 1701. It has also maintained a Malay Protestant Church in Java, the Moluccas and Celebes, which now has about 400 ministers and 250,000 adherents, of whom probably one half are descendants of the 17th century converts. A similar state missionary enterprise undertaken by a Protestant Government of Europe was the Danish mission to South India, founded by King Frederick IV. of Denmark in 1706. The king sent out as the first missionaries to Tranquebar, Ziegenbalg and Plutschau, Germans from Francke's school at Halle. Other Germans from the same surroundings followed, notably Schultze and his later associate Schwartz, making this Danish mission the first serious Protestant mission in India. Ziegenbalg translated the New Testament into Tamil (the third of modern translations of Scripture into heathen language), and before the end of the century from 30,000 to 50,000 Tamils had become Christians.

Another mission maintained by Frederick IV. of Denmark was that commenced by Hans Egede in Greenland in 1721, and later transferred to the care of the Danish Missionary Society. This mission Christianized the whole Eskimo population in the vicinity of the Danish trading stations.

The British Government showed a similar sense of responsibility for missionary work in its colonies, and the duty of preaching to the North American Indians was laid down in the charters of Virginia (1584) and Massachusetts (1628). Parliament even went so far as to consider in 1648 the endowment of a state foreign missionary enterprise. It voted a grant in aid of the "Society for the Propagation of the Gospel in New England," formed in 1649 and still existing under the name of the New England Company, which educates Indians in Canada with the revenues of the ancient government grant. John Eliot of Roxbury, Thomas Mayhew of Martha's Vineyard, and others through this government solicitude received state support in their missionary work for Indians. The British East India Company, moreover, was required by its charter in 1698 to maintain chaplains at its stations, and to instruct its Hindu servants in Christian doctrine.

All of these state enterprises in the line of foreign Protestant missions were uncertain in method and precarious in stability. They served, at least, to show the possibility of prosecuting missions in the colonies, and were sufficiently barren to suggest the formation of those voluntary societies for missionary effort which proved to be the effective form in which the missionary idea among Protestants was to express itself.

Unsatisfactory religious conditions in the East India Company's trading posts led in 1698 to the organization of the "Society for the Promotion of Christian Knowledge," with the purpose of providing books and schools for neglected English communities, and in 1701 to the appearance of the "Society for the Propagation of the Gospel in Foreign Parts," intended to provide for the religious culture of Englishmen residing in foreign lands. Both of these societies were directed by the Church of England, although voluntary in form and in the sources of their revenues. Neither of them were Foreign Missionary Societies. But the first now publishes books in Oriental languages, and it saved the Danish Mission in South India from dying with its royal founder, and supported it during a century, until it was taken over by the Society for the Propagation of the Gospel. This latter Society, too, has gradually taken up the work of evangelizing pagans until now it has about 700 missionaries in India, China, Japan, Malaysia, Africa, and the West Indies, with nearly 3,500 native clergy and laymen in the various departments of its work. These two societies then, founded about the beginning of the 18th century, may be considered as the pioneers of the voluntary foreign missionary societies of Protestant Christendom.

It was not until the 19th century was about to dawn, however, that a general movement toward Missionary enterprises began among Protestants in Europe and America. This movement grew out of that revival of personal religion in the 18th century which was fostered by the writings of Spener and Francke, the Pietists of Halle, and by the devoted lives of men like David Brainerd of Connecticut, and Zinzendorf, the patron and leader of the Moravians, and was stimulated by the exhortations of Whitefield, the Wesleys, and Jonathan Edwards, and by the example of the "Unity of Brethren" (*Unitas Fratrum* or *Brüder Unität*) as the Moravians call themselves. The Moravians, not as a church that begs men to volunteer, but as a community in which every member has equal interest in the missionary idea, were the first decided champions of Protestant Missions. They held it the duty of all Christians to tell men what benefits they have received from Jesus Christ. They established missions between 1732 and 1770 in the West Indies, in Greenland, in the Indian settlements of North America, among the Hottentots of South Africa, and in Labrador. They now support more than 300 missionaries and 1,800 native preachers and teachers in their various mission fields which include, besides those already named, Alaska, Australia, and the border lands of Tibet. The English Wesleyans should also be reckoned with the Moravians as having taken up missions in advance of the general movement of the Protestant churches. They did not formally organize the Wesleyan Methodist Missionary Society until 1814. But in 1779 they employed missionaries among the North American Indians, and in 1786 they began an important work among the slaves of the West Indies. The Society now has 280 missionaries, and 3,634 native workers and teachers in India, Ceylon, South Africa, China, Polynesia and the West Indies.

Before this extension of Wesleyan Missions took place a surprising outburst of zeal for the missionary idea appeared almost simultaneously in England, in the United States and on the continent of Europe. It was a revolution, since formalism had made the Protestant churches almost forget that to be a Christian means to be always in some sense a missionary. The characteristic feature of the movement was its origin in the conscientious convictions of isolated individuals, from whom the Church did not expect initiative and whom it sometimes regarded as unsteady enthusiasts. William Carey, a cobbler and a Baptist minister in England, made the first move in 1786 and was frowned down by his elders. But in 1792 his earnest conviction carried the day; twelve men united to form the Baptist Missionary Society (England); and Carey and Thomas went to India as its first missionaries. There is no space here to describe the marvelous activities of Carey and his associates Marshman, Ward, and others, at the Danish trading post of Serampur near Calcutta, where they were given asylum when the East India Company refused to tolerate their presence in its territories. The great school buildings which these missionaries erected at Serampore stand to-day, and their press added to the then slender stock of Bible translations, passably good versions of Scripture in 34 Oriental languages and dialects. The Baptist Missionary Society has about 400 missionaries and 2,300 native preachers and teachers in India, Ceylon, China, Africa, and the West Indies.

This example was contagious. In 1795 "The Missionary Society" was formed in London by the union of notable men of four different denominations. Its name was afterward changed to "The London Missionary Society." It is now substantially composed of Independents (Congregationalists) alone, and has about 325 missionaries and 7,000 native preachers and teachers, in Polynesia, New Guinea, Madagascar, Africa, India, and China. In 1796 two similar societies were formed in Scotland which at first aided the London Society, but later took up independent work in the West Indies and in South Africa, and finally (1824) became merged in the Church of Scotland Foreign Missionary Committee, of which a later (1843) offshoot was what has now become the Foreign Missionary Society of the United Free Church of Scotland. The Church of Scotland Foreign Missionary Committee now has about 200 missionaries and 600 native workers, and the United Free Church has 500 missionaries and 3,000 native preachers and teachers in India, China, Africa, Arabia, the New Hebrides, Manchuria, and the West Indies. The same impulse led in 1797 to the formation in Holland of the Netherlands Missionary Society. This was first an auxiliary of the London Missionary Society but soon undertook independent work. In 1909 it had 30 missionaries and 75 native workers in the Dutch East Indies.

The same conviction of responsibility together with realization of the extent and condition of the heathen world led in 1797 to the organization in London of 26 men belonging to the Church of England as the "Society for Missions to Africa and the East." This name later gave place to the familiar one of the "Church Missionary Society." Among its founders were William Wilberforce, Henry Venn and Charles Simeon; but the Church of England gave the Society no encouragement until the successes of nearly 50 years compelled recognition. Hence the first missionaries of this Society were commonly Germans; for the most part men of the highest ability and attainments. The fields of the Church Missionary Society are India, Ceylon, China, Japan, Africa, Mauritius, New Zealand, Persia, Palestine, Egypt, the Sudan and the Arctic regions of British North America. It now has about 1,500 missionaries and 10,000 native preachers and teachers.

Missionary enterprises next began to spring up in Germany and in America. The marked characteristic of the movement in every case was the same profound conviction of individuals, commonly not officials of the churches to which they belonged. Three students of Williams College in Massachusetts furnished the initiative that resulted in the organization of the "American Board of Commissioners for Foreign Missions» in 1810. This was at first an interdenominational Society. Its first missionaries, Newell, Judson, Hall, Rice, and Nott, were sent to India and were ordered out of the country by the East India Company the moment they landed. Judson and Rice took refuge with the English Baptists at Serampur, while the others succeeded in effecting a lodgment at Bombay and in Ceylon. The fields of this Society in 1903 were India, China, Japan, Ceylon, Africa, Turkey, and Micronesia, and it had 544 missionaries and 3,581 native preachers and teachers. After 40 years of existence as an interdenominational Society, it handed over its missions in Persia, Syria, and the Gabun region of West Africa to the Presbyterians, and part of its field in South India to the American Reformed (Dutch) Church, and has become substantially a Congregationalist body. Judson and Rice of the earliest missionaries of this Society decided on arriving in India that they would prefer to serve under a Baptist organization and this decision led to the formation in 1814 of what is now the «American Baptist Missionary Union» of Boston. Burma was the field selected for its first efforts and the heroic work of Adoniram Judson in that land made his name great among modern Protestant missionaries. The «A. B. M. U.» had 600 missionaries in 1909 and 4,000 native workers in Burma, Siam, Assam, India, China, Japan, and Africa.

Meantime, in Germany, Jannicke of Berlin, whose brother was a missionary of the «Danish Halle» band in South India, opened a Missionary Training School at Berlin in 1800. This school during the next 25 years furnished about 80 missionaries to the service of the English and Dutch Societies, and served to arouse interest in Missions among the Germans. Its influence led in 1815 to the establishment of a Missionary Training Institute at Basel in German Switzerland. The latter institute furnished many admirable men to the service of other societies and in 1822 began to send out missionaries of its own. The fields of the Basel Missionary Society are in India, China, and Africa, and graduates of its Institute are pastors of Protestant churches in Turkey. It now has in the field about 400 missionaries and 1,800 native workers.

In 1824, 10 strong men in the Lutheran Church, among whom were Neander and Tholuck, formed the Berlin Missionary Society; beginning operations, according to the wise continental practice, by opening a Training School for missionaries. It began to send out missionaries in 1834 and now carries on missions in Africa and China. Its working force in the field now consists of about 150 missionaries (wives of missionaries not counted) and 1,000 native preachers and teachers. Other Missionary Societies sprang up in Germany during the first quarter of the 19th century, at first as auxiliaries to existing boards. Several of them, like the Gossner Society, the Hermannsburg, the Rhenish, the Leipzig, the North German, and the Breklum Society developed into independent existence, and these together had 510 missionaries in 1909 with 3,500 native preachers and teachers in the Dutch East Indies, Africa, India, China, and Australia.

The same period saw the formation in France of the Paris Evangelical Missionary Society (1824), designed at first merely to aid existing enterprises, but quickly beginning to send out missionaries of its own. In 1909 it had 150 missionaries, men and women, and 1,000 native workers, in Senegambia and the Barotse and Basuto regions of Africa. With the development of French colonial expansion it has also taken the place of the London Missionary Society's missionaries in Tahiti and in parts of Madagascar, and of American missionaries in the French Kongo region. Protestant missionary societies in Denmark, Sweden, Norway, and Finland sprang later from the same causes and are doing good work in Africa, India, China, Chinese Turkestan, and Madagascar.

The same spiritual awakening of widespread effects gave rise also to the British and Foreign Bible Society (1804), the American Bible Society (1816), the Netherlands Bible Society, the Religious Tract Society of London (1799), and the American Tract Society of New York (1820). The Bible Societies do true foreign missionary work in publishing the Scriptures as soon as missionaries have translated them into the languages of non-Christian peoples, and in disseminating the Scriptures in these languages. Some 400 modern translations have been published. The British and Foreign Bible Society in 1909 had 30 agents employed in non-Christian lands with 1,500 native colporteurs and Bible women, and its total issues (at home and abroad) of Bibles, New Testaments and lesser parts of Scripture amounted to 6,000,000 copies. The American Bible Society has 20 agent, 600 native colporteurs in mission fields, and issued in 1909 some 2,100,000 copies. The Scottish National Bible Society issued in the same year 700,000 copies, besides joining with the first named Societies in providing finances for translating and publishing the Bible in various languages.

The Tract Societies aid missions in a similar manner; providing funds for the publication of undenominational Christian literature in the languages of non-Christian peoples. The Religious Tract Society of London at its Centennial Anniversary was able to report that it had given for this purpose to English and American Foreign Missions aid equivalent to $100 per day during the whole period of its existence.

In the second quarter of the 19th century the American Methodist Episcopal Church and the American Presbyterian Church began their missionary work in foreign lands. Almost all denominations in the United States and in Great Britain now have Foreign Missionary organizations of their own, and since the middle of the century the British colonies in Canada, India, Australia, South Africa, New Zealand and the West Indies, and to some extent the Dutch colony in Java, have begun foreign mission enterprises of their own. Interdenominational and international Missionary Societies, like the China Inland Mission, the North Africa Mission, the Christian and Missionary Alliance and other bodies of greater or less importance have been formed to carry on missionary enterprises by methods more free from machinery than the older Societies sometimes seem to require. The total number of Protestant Missionary Societies now existing is difficult to ascertain with accuracy. It probably exceeds 500. According to Beach ('Geography and Atlas of Foreign Missions') (1902), these Societies employed 16,613 missionaries of both sexes and 75,281 assistants who are native in the regions where they work.

Three points are especially noteworthy, in the history of the development of these Missionary Societies, as each marking an epoch of expansion in the scope of Protestant Missions. These are: (1) The adoption of education as a missionary agency; (2) The general adoption by women of mission work for womankind; (3) The establishment of medical missions.

1. *Education.*— The aim of Foreign Missions is to tell of Jesus Christ to those who do not know Him. The aim is to lead them to surrender self-will to the control of Jesus Christ so completely that converts shall be true Christians, who, if the missionary leaves to-morrow, will stand immovable in their devotion and their impulse to teach others the truth that has benefitted themselves. At the outset the task seemed simple enough. To preach and preach again was all that was necessary. As a result of the first half century of experience, the discovery was made that common schools are essential in all missions which urge the reading of the Bible. Rev. Dr. Alexander Duff, a missionary from Scotland who has left ineffaceable marks upon India, was a leader in championing the thesis that education in all grades is also a legitimate and essential department of missionary effort. This principle is now established with all that it means of general enlightenment for backward races, and in 1909 there were in the Protestant missions throughout the world nearly 30,000 educational establishments of all grades from kindergarten to university, attended by about 1,500,000 young people of every form of religious belief.

2. *Woman's Work.*— As early as 1825 missionaries undertook the education of girls in India, Africa, Turkey and elsewhere. In 1835 a Woman's Missionary Society was formed at Berlin, Germany, for the instruction of women in the East; and later schools for girls were opened in several non-Christian lands by different missionary societies. It was not until 1860 that the women of Christian lands began to take the matter into their own hands. Beginning with the Woman's Union Missionary Society of New York (1860), mission boards of women were organized in almost all the Protestant denominations of Great Britain, Canada, and the United States. These missionary societies of women are for the most part closely allied to the general missionary boards of the denominations to which they belong, but they send out women as missionaries and have produced another vast extension of the scope of the missionary enterprise. The impossibility of carrying on successful missions without women missionaries to win and instruct their own sex is now fully recognized. There were in 1909 about 4,000 unmarried women working as missionaries in all parts of the non-Christian world. No mission field is so dangerous or so repellent in its barbarism as to be denied the ministering service of devoted women of Christendom.

3. *Medical Missions.*— The science of missions has grown out of experience. At the outset physicians were sent to the missions with the primary duty of caring for the health of missionaries. They could not, however, fail to use their knowledge for the relief of suffering in lands where surgery was unknown and the art of medicine parodied by natives. In 1841 the "Edinburgh Medical Missionary Society" was formed to increase the number of such physicians. It was not until about 1885 that the Medical Mission was fairly established as a recognized channel of missionary influence. Since that time the number of missionary physicians, both men and women, and of missionary hospitals and dispensaries has increased every year. Beach in his 'Atlas of Protestant Missions' (1902) gives 898 as the number of such hospitals and dispensaries in Asia, Africa, and Oceania, and the number of patients who receive treatment each year is more than 2,500,000. The enormous broadening of the influence of Foreign Missions need not be emphasized which results from their entering upon the training of children, the enlightenment of women in the seclusion of the home, and the healing of the sick who without this ministration would suffer and die.

Results of Foreign Missions.— Nothing like full statistical tables of these numerous missionary societies would be possible were it not that more and more the various denominations regard all missionary enterprises as essentially one. Fifty years ago the missionaries of different denominations in India began a practice of holding conferences together to plan for the more effective prosecution of the common work. Such conferences of missionaries are now held regularly in India, China and Japan. More than this, the missionary societies of Europe and America have adopted the same plan. General conferences of the societies have been held with great mutual advantage, the most notable of these being the Conference of London in 1888 and the Ecumenical Conference of New York in 1900. The German missionary societies confer together each year, and so do the secretaries of the British societies. So do those of some 40 societies in the United States and Canada. The result is steady advance toward a more economical management of all missions, marked diminution of possible friction between different denominations, and a fuller knowledge of the work that each denominational society is undertaking. The following statistics, which aim to cover the

	Communicants	Professed Christians including children of converts	Missionaries (men and women)	Native workers (men and women)	Places of worship	Schools of all grades	Hospitals and dispensaries
American Continents, including Greenland and West Indies....	150,039	514,514	2,251	6,413	3,574	1,169	17
Australasia, New Zealand and Oceania	80,639	487,039	473	3,606	2,322	2,898	23
Asia, including Turkey..........	810,645	2,537,250	9,156	40,402	13,747	13,783	715
Africa	342,857	1,000,152	3,335	22,279	9,401	6,664	143
Total.........................	1,384,180	4,560,955	15,215	75,700	27,044	24,514	898

work in non-Christian lands of all missionary societies, are compiled in the main from Beach's 'Atlas' (1902) with some later additions.

Figures are proverbially uncertain agents for setting forth facts. In the statistical tables of missions the enormous areas from which they have to be gathered ensure that before they can be collated and put in print they are already stale. Leaving this out of account there remains the need to caution in deductions based on mere figures. The enthusiast may forget, on seeing the number of converts recorded, that there is no miraculous short cut by which the pagan savage may be transmuted into a gentleman of ethical and intellectual perfection. In any groups of people instructed and changed through missionary effort the majority are and will long remain infants in growth. As in Christian so in non-Christian lands a minority only grow so far as to do things that give them weight in valuations of the community. On the other hand, doubters may easily put too low a value upon such figures and rate these converts as worthless because they are mere fallible human beings. Events have tested converts from paganism in India, Africa, China, and in fact in all mission fields, with the result of showing that sincerity, unselfishness, and stability exist among them. Men from the lowest have risen to the highest ability, like the slave-boy Crowther of Yorubaland, and Constantian of Turkey whose Hebrew and Greek scholarship made them notable among Bible translators; or like Abdul Masih and Imaduddin of India, converted Mohammedans whose work in the Christian ministry proved them masters of Christian apologetics; or like Dr. Saleeby of the Philippine Islands, the assistant commissioner for dealing with the Moros of Sulu, whose origin was in an obscure village of Mt. Lebanon in Turkey, and whose qualifications for his high office were gained in the American Missionary schools of Syria. Men and women of humble surroundings in all the non-Christian lands have been transformed from superstitious and morally degraded barbarians into useful members of the race, of a purity of life that would be noteworthy in the most favored lands. And their influence is great in accord with this fact. The increase of the population of British India in the decade 1891–1901 was about seven per cent, while the increase of the number of Christians in India during the same period was about 30 per cent. In Uganda in central Africa the number of converts baptized by the missionaries of the Church Missionary Society in 1902 was about 4,000. In both of these cases all testimony agrees in showing that the increase is largely the result of the influence of the pure lives and the active and earnest convictions of natives previously converted. Of the 100,000 converts added in 1902 to the communion of Protestant missions in all parts of the world it is probable that more than half were led to Christianity in the same way. Such examples tend to show that the influence of missions is cumulative upon the people among whom they are established, and in this case the figures of statistical tables have a weight which may be easily underestimated.

Much might be added in respect to the effect of missions in extirpating degrading, immoral, and cruel customs, like cannibalism, or widow-burning, or human sacrifice and in elevating the standing of womankind everywhere, and in endowing illiterate languages with alphabets and the beginnings of a literature, and in teaching peoples to be producers who have been mere parasites, living by the sword on the industry of others. Much might be added on the indirect influence of missions in adding great areas, as in the islands of the Pacific, and in Africa to the fields of the world's commerce and in producing a general moral and intellectual uplift as in India and China of peoples who have not accepted the religious message of the missionary. The aim of foreign missionary enterprise is so beneficent and its agencies so thoroughly devoted to the aim; it is conducted on so broad a view of the scope of its purpose; its methods have been so perfected by experience and conference, and it so surely penetrates to the deepest sources of social evolution among the masses with whom is the reserve vitality of every nation, that it must be taken into account in reckoning up the agencies by which Europe and America are shaping the destinies of the great and mysterious East.

Bibliography.— For statistics and history: Warneck, 'History of Protestant Missions' (1901); Dennis, 'Centennial Survey of Foreign Missions' (1902); Beach, 'Geography and Atlas of Protestant Missions' (1901–3); 'Encyclopædia of Missions' (1904). For Sociological relations of Missions and the methods in use: Dennis, 'Christian Missions and Social Progress' (1897–9); 'Report of Ecumenical Missionary Conference' (1900); 'Report of the Centenary Conference on Foreign Missions' (1888). For views of separate missions and different countries, the volume of books is so great as to make selection almost invidious. A few good recent works are: (for India) Jones, 'India's Problem' (1903); (for Siam) Curtis, 'The Laos of North Siam' (1903); (for Turkey) Dwight, 'Constantinople and its Problems' (1901); (for the Philippines) Brown, 'The New Era in the Philippines' (1903); (for Africa) Stewart, 'Dawn in the Dark Continent' (1903). Histories of the larger Missionary Societies also contain a mass of valuable information respecting the mission fields: 'History of the Church Missionary Society' (1899); 'History of the London Missionary Society' (1898); 'Two Hundred Years of the S. P. G.' (1901).

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Missions, Protestant Home. Home missionary effort in the United States is older than its organized form. Before the War of the Revolution individual churches in New England and New York were sending their pastors, for weeks or months at a time, into the new settlements, to preach the Gospel and administer the ordinances of religion. Connecticut pastors received for this service $4 a week, and $4 more were allowed for the supply of their pulpits, the money being raised by voluntary subscriptions among the home churches. These desultory efforts continued more or less intermittently for 25 years: they were warmly welcomed by the struggling settlements and were influential in preparing the way for better organized endeavors.

Organized American home missions began with the establishment of the "Missionary Society of Connecticut," 21 June 1798, by the Congregational churches of that State. Massachusetts Congregationalists followed one year later, 1799, with the "Massachusetts Missionary Society." Both of these Societies, bearing the names of the States where they originated, and supported by the States whose names they bear, were not primarily for the benefit of Connecticut and Massachusetts. The object of the Connecticut Society, as stated in its charter, was "to Christianize the heathen (Indians) of North America and to support and promote Christian Knowledge in the New Settlements of the United States." The charter of the Massachusetts Society describes its object as being "to diffuse the Gospel among the heathen (Indians) as well as other peoples in the remote parts of our country." Both Societies, therefore, while local in their origin and support, were truly national in spirit and aim. Other New England States followed the lead of Connecticut and Massachusetts in organizing similar societies; New Hampshire in 1801; Rhode Island in 1803; Maine and Vermont in 1807, all of them under Congregational auspices. They all continue to the present time with but slight changes in name, and with increasing devotion to home missions, State and National. The first organized movement on the part of the Baptist churches was made in 1802, when the "Massachusetts Domestic Missionary Society" was established at Boston, with the same broad object as its Congregational predecessors, namely: "to furnish occasional preaching and to promote the knowledge of evangelistic truth in the new settlements of these United States, or further, if circumstances should render it proper." To the same year 1802, belongs the first systematic effort of the Presbyterians of New York, Pennsylvania, and New Jersey, acting under the same broad charter with those of the Congregationalists and Baptists of New England; "to send forth missionaries well qualified to be employed in mission work on the frontiers, for the purpose of organizing churches, administering ordinances, ordaining elders, collecting information concerning the state of religion in those parts, and preparing the best means of establishing a Gospel ministry among the people." Meanwhile the Reformed Church of America had not been idle. Sporadic missionary work began with it as early as 1786, culminating in 1822 in the organization of the "Missionary Society of the Reformed Dutch Church," differing nothing in spirit from its forerunners, but with a wider scope, as it included home and foreign missions under a single organization. Methodist and Episcopal missions, as well as the Lutheran and those of the Disciples of Christ, belong necessarily to a later period.

It is important, historically, to remember that all these early missionary bodies were called into being by one motive and for one object. Barbarism in the new settlements was the common dread of the East, and to prevent such a disaster by pre-empting those rapidly gathering communities with religious institutions was the motive of all early home missionary organizations. At the opening of the 19th century, what was known as the new settlements were found mainly in northern New England, eastern and central New York and northern and southern Ohio, and these were the first points of home missionary attack. The opening of the Northwest Territory and the passage of the Ordinance of 1787 attracted a stream of emigration from the East, mingling with which was a considerable element from Great Britain, Holland, Scandinavia, Germany and Moravia, Belgium and Switzerland. The earlier settlers in New York, Ohio, Indiana and Illinois were generally Protestant in their sympathies, but unable at once, with a new country to subdue and new homes to be built, to provide themselves with the institutions of worship. To the help of these hopeful but destitute settlers came the missionary organizations of the East. Their missionaries were hurried forward to every needy point, not only in the wilds of New York and Ohio, but to the remoter settlements of Indiana, Illinois, Kentucky and Tennessee. They even found their way down the Mississippi to New Orleans and crossed the northern borders to Canada. A specially promising field of effort was a section of Ohio, bordering on Lake Erie, settled chiefly by emigrants from Connecticut and for this reason commonly known as "New Connecticut." At the beginning of the century the tract contained about 1,400 inhabitants. In 1804, it had 400 families; one year later the 400 had become 1,100, one half of them from New England. In less than thirty years from the beginning of organized home missions 90 churches had been planted, all of them by home missionaries sent out and supported by Connecticut and Massachusetts. To sum up in a sentence the work of the Missionary Society of Connecticut at the end of 30 years, 200 missionaries had been employed whose joint labors were equivalent to 500 years of ordinary service by one man, and 400 churches had been established in the new settlements of the land. With what wear and tear of body, with what sacrifice of comforts in the wilderness, with what patience of hope and courage of faith and labors of love, no words can fitly portray. Not a mile of railroad had been built. The river and the canal, the stage coach, the emigrant wagon, and the saddle, were the only conveniences of travel, and to these the missionary added foot-sore and weary tramps from settlement to settlement. During the same period 125 Puritan churches had been gathered in the growing settlements of New York State, supported in whole or in part by home missionary funds.

All these earlier efforts were marked by a commendable absence of the sectarian spirit. A common danger threatened the nation. The problem presented to the churches of the East was how to overtake the new and rapidly multiplying settlements with the means of Christian civilization. No rivalry entered into the struggle, but only a strong sense of the need of prompt, united action. In their love of humanity and of country every thought of denominational supremacy was buried under the all absorbing issue whether the New America should be heathen or Christian. This spirit was particularly active between Presbyterians and Congregationalists which were then the strongest church bodies in the land; for 50 years, between 1801 and 1851, they carried on their missionary work in the new settlements under a "Plan of Union," mutually agreed to, by which the churches of either order, wherever formed, might worship in the same house, listen to the same pastor and profess the same creed, while at the same time they were left free to govern themselves by the polity they loved and preferred.

In 1820, Congregational, Presbyterian, Reformed and Associated Reformed churches, united at New York city in organizing a National Society. Such change of policy had become necessary. Hitherto, State Societies had been doing national work, each in its own way. But several missionary organizations working independently had resulted in an unequal distribution of men and money. Some sections had been over-supplied and others were left destitute. Moreover, the laborers themselves came into conflict with each other. The time had arrived for federation and co-ordination of effort, and to this end the American Home Missionary Society was organized, as above stated, with headquarters in New York city, the various State Societies making themselves auxiliaries to the National organization. Perhaps nothing more potential in the progress of American Home Missions belongs to its history than this act. For years the churches making the alliance labored together in fraternal unity, contributing to a common treasury and governed by a single board of direction. Receipts rapidly increased, the missionary force doubled and trebled, and instead of being an itinerant preacher, the home missionary became a settled pastor, dwelling among his people. It was only when these allied church bodies had grown strong that they withdrew one by one to organize separate Societies, leaving the Congregationalists to inherit the name and traditions of this honored organization. Indeed, it was not until many years later that «American» was dropped from its charter name and the designation of «Congregational» was substituted. Meanwhile the Methodists had organized their «Missionary Society» (national) in 1819, including home and foreign work; the Episcopal Church, its «Domestic and Foreign Missionary Society,» in 1821; the Baptists, their «American Baptist Home Mission Society» in 1832, also national; the Lutherans, their «Home Missionary Society of the General Synod» in 1845, and the Disciples, their «American Christian Missionary Society, in 1849. The Southern Presbyterians, Southern Baptists and Southern Methodists have also their home missionary organizations which are doing a great religious work in the Southern States. Thus, by natural evolution, all the leading church bodies of America have gradually become organized for home evangelization and a movement, which began in 1798 for the Christian enlightenment of the New Settlements, has developed into a system as broad as the national domain, by which the stronger churches of the land are sharing the burdens of their weaker brethren and strengthening those forces of Christian civilization upon which the safety of the nation depends.

The purchase of Louisiana (q.v.) 100 years ago imparted a mighty impulse to the missionary movement. That expansion gave us the mouth of the Mississippi and undisturbed possession of its entire course. It carried our western boundary from Lake Superior to the Rocky Mountains, doubling the national area by a stroke of the pen. Fourteen States and Territories have been carved out of the Louisiana Purchase. They include the great corn and wheat belts of America, and their underground treasures are among the richest of the world. Emigration from the East and Middle West began at once and has reached enormous proportions. It is rivaled in volume only by the millions of foreign birth that have poured and are still pouring into this new and mighty West. By these movements a great missionary problem was presented which the organized home missionary army welcomed with zeal and have never wearied in their efforts to solve. The order of missionary progress through the Louisiana Purchase was strictly along lines of immigration. There is not a State in that vast tract which the home missionary did not enter while it was yet a Territory, and always in the first and feeblest stages of settlement. From Missouri to Iowa, from Iowa to Minnesota, Kansas, and Nebraska, thence to the Dakotas, and on from these points to Wyoming, Colorado, and Montana, and last of all, when the door was opened, to Oklahoma, until every State in this imperial purchase has been leavened with Christian institutions. Something of the volume of this work may be gathered from the fact that in 1895 over 27,000 Protestant churches were enumerated within the Louisiana Purchase, holding property to the value of $58,000,000 and having 1,912,000 communicants, and, with rare exceptions, this church growth is the fruit of home missionary culture, begun, maintained and supported until the need ceased, by the missionary revenues of these Eastern Societies. The same process was repeated when about midway in the century the Oregon Treaty made sure our possession of the Northwest and the discovery of gold opened the Californias to the world. Home missionaries ordained in the East promptly started for the Pacific Coast, reaching their fields by the way of Cape Horn and the Sandwich Islands. The strategic position of the far West and Northwest as related to the work of foreign missions in China and Japan was keenly appreciated by the churches and their missionary boards at the East. Money was contributed freely and many of the ablest preachers of the East went forth cheerfully to lay the foundations of Christian society on the sunset shores of the Republic. «The Mexican Cession,» including Texas, New Mexico, Arizona and Utah, was another belt of peculiar missionary need, which in spite of ancient superstitions and modern delusions, has proved a rich field of rewarding home missionary effort.

The close of the Civil War introduced, at the South, a home missionary problem that was absolutely new, and which continues to absorb the interest of northern churches to an extraordinary degree. Four million slaves were suddenly set free. Government opened its bureaus of relief, and the churches of the North through their missionary boards hurried forward preachers and teachers. The greatness of the opportunity quickened the home missionary spirit of the whole country. Several of the boards opened freedmen's departments and the churches magnified the privilege of responding to their appeals. To the missionary, himself, there was in this call an element of peril which, so far from deterring him, only stimulated his zeal. The Yankee preacher and teacher were not well received at first by the white South. Social ostracism was not the only penalty they had to face for their devotion. Violence to their persons and destruction of their property were not infrequent in the early years of this missionary endeavor. An ugly spirit of caste included the negro teacher with the negro, and young women delicately reared in the best homes of the North suffered from neglect or open indignity. These conditions have mostly passed away; respect, and even gratitude, on the part of the South, have been won, as the fruits of this vast home missionary effort have become more apparent. These fruits appear not only in organized churches for the negro race, but in a long array of universities, colleges, academies, normal, common, and industrial schools, planted exclusively for the benefit of the blacks, all of them specifically Christian, and all of them originally supported by the free-will offerings of northern churches. Howard, Hampton and Fiske, Atlanta and Tugaloo, Talladega and Straight, Shaw and Richmond, Wayland and Leland, Nashville and Bishop, and a host besides, are names as familiar to the educational world as Harvard, Yale, or Princeton. They are all the fruit of negro emancipation and all of them are the creation of home missionary interest and enterprise.

It was in 1840 that foreign immigration began to attract the attention of the friends of home missions. Up to that time its entire volume from all sources had not exceeded 500,000. Then began the flood. During the next 30 years the country received about 6,000,000 foreigners. Driven by famines and oppressions at home and drawn by the opportunities of labor in a new country and by our generous homestead laws, they were arriving, for continuous years, at the rate of from 500 to 1,000 per day. Between 1865 and 1885 more than 7,000,000 were added to our foreign population, which means that in these 20 years foreign immigration exceeded that of the entire previous record of the country. It is needless to say that, as this vast problem began to be measured and sanely comprehended by the churches, the appeal of home missions was almost revolutionized. Hitherto that appeal came from our own people and often from our own kin. To follow close after them on the westward trail and to stand with them in planting the church and the school had been for years the whole of home missions. While this feature has never lost its claim and probably never will, another claim has entered to divide the attention and concern of the churches. To the peril of domestic heathenism has been joined the larger fear of imported barbarism, and thus for many years foreign missions at home has come to be a distinct interest of American Home Missions. All branches of the church have taken part, through their organized societies, in this effort to Christianize the alien. No nationality has been overlooked; Germans and Scandinavians, Bohemians, Poles and Russians, Hollanders and Hebrews, Spanish, French, Italians, Armenians, Chinese, every sort and condition of foreigner, however forbidding or hopeless, has been made the object of home missionary culture, with results that have astonished the most sanguine believer and rebuked the most despairing doubter and which have all but silenced the prophets of evil who predicted the direst consequences from the infusion of so much foreign blood into the moral, social, and political life of the nation. Many times over it has been demonstrated that every grade of foreign immigrant is susceptible to religious development and is entirely capable of being both civilized and Christianized, and is in fact being rapidly assimilated, through the agencies of education and religion, into the best types of American life. Great migrations are not feared to-day as they were in 1840. Fears have been quieted and the native American stock have come to view with less and less alarm, what 50 years ago almost crazed them with apprehension.

To attempt any adequate summary of the results of Home Missions at the end of 100 years, would require a survey of the development of 50 States and Territories, so vitally have the home missionary and his work entered into the beginnings and the early history of all our Commonwealths. A few salient facts must suffice. The vitality of the home missionary idea has shown itself, first of all, in the growth of organizations. Beginning in 1798 with the Connecticut Missionary Society it has multiplied itself into more than 30 home missionary bodies, all Protestant, all evangelical and all national. These organizations have collected and disbursed $140,000,000. Their chief agent has been the Church, with its ordained preacher and its divinely appointed ordinances, and for the Church, these millions have been given. This total, however, takes no account of co-operating agencies, which have been called into being to serve the missionary work of the churches. Add these: Sunday School planting; Bible and Tract printing; Church building and Christian education; which by careful inquiries are found to have expended $150,000,000 more, and the grand total for Home Missions, root and branch, in organized form, is $290,000,000. Not a dollar of this immense fund has been *paid* in any commercial sense for value received. All of it has been *given,* a free-will offering of Christian people to mark their intense conviction of the peril of a nation without the Gospel, and their supreme faith in its leavening power. What have these millions accomplished and what of visible fruits remain to justify their cost? It is a fact not generally known, and when known not sufficiently appreciated, that the great evangelical bodies of the United States trace most of their church organizations directly to Home Missions. Congregationalists admit that four fifths of their churches are of home missionary origin. The proportion would be larger but for the fact that hundreds of their churches were born before home missions began. Presbyterians confess that nine tenths of their churches are of home missionary planting. Baptist, Methodist and Episcopal estimates range from five sixths to nine tenths. Such ratios can mean but one thing; that these far spreading ecclesiastical bodies have become strong in church power, not by their own help but by home missionary aid, the few, strong, bearing the burdens of the many, weak, and they answer the inquiry which suggests itself at once to a thinking mind: where and what would these ecclesiastical establishments be to-day but for the helpful agency of organized Home Missions? To the credit of home missions, therefore, should stand the undoubted truth, that an overwhelming majority of the evangelical churches of America owe their being to its nurture and care. What does such a fact mean in the religious development of the country? In the year 1899, the United States had one evangelical communicant in 14.50 of the population. In 1850 that ratio had grown to one in 6.57; in 1870, to one in 5.78; in 1880 to one in 5; in 1890, to one in 4.53; and in 1909, to one in 4.25. In other words, evangelical church membership increased three and one half times faster than the population, in less than 100 years. Between 1800 and 1890, population increased 11.8 fold; in the same period evangelical church membership increased 38 fold. To these figures, Dr. Daniel Dorchester, their compiler, adds the comment: «This exhibit of religious progress cannot be paralleled in the history of God's kingdom in any land or any age.» It is only 130 years since Voltaire in Geneva declared: «Before the beginning of the 19th century Christianity will have disappeared from the earth,» and it is less than 100 years ago that American infidels were prophesying that the Church would not survive two generations in this country. In defiance of these dismal auguries between 1800 and 1850, the average yearly increase of evangelical communicants was 63,302: between 1850 and 1870, 20 years, 157,170: between 1870 and 1880, 10 years, 339,258: between 1880 and 1890, 10 years, 375,765, and during four years, between 1890 and 1894, 348,582, the prophecy of a larger average than ever for the last decade of the century. It is no vain boast, therefore, but the obvious truth, that by far the larger part of this remarkable growth is due to the direct agency of American Home Missions, since in its own carefully planted gardens most of this growth has taken place. But not the only, nor even the highest, fruits of home missionary effort are contained in these numerical results. President Roosevelt, in a recent public address, declared; «It is such missionary work that prevented the pioneers from sinking perilously near the level of the savagery against which they contended. Without it the conquest of this continent would have had little but an animal side. Because of it, deep beneath and through the national character, there runs that power of firm adherence to a lofty ideal upon which the safety of the nation will ultimately depend.» Thus Home Missions has been in a very true and high sense both the builder and the savior of the American nation. In a government of the people and by the people, nothing counts for so much as high ideals of duty. With these enthroned in the thought and life of its citizens a nation may meet any shock from within or from without: and nothing has yet been discovered on earth or revealed from heaven that has the power to create higher ideals of duty than Christianity and the obligations it inculcates. It is thus that missionary societies, whose sole function is the planting of churches, enter into the hidden life of a nation in ways that political parties can never enter, and which even Christian men are sometimes slow to appreciate. Not only law, order, temperance, respect for the Sabbath, security of life and property, and the claims of humanity, are thus conserved and fostered, but the instinct of patriotism itself, in which the very life of the nation consists, finds its nursing mother in the Church of Christ. Many victories of a Christianly educated public sentiment might be cited in American history, but the Civil War of 1861 furnishes a typical example. When that inevitable conflict came the value of 65 years of church planting by American Home Missions in the East, the West, and the Northwest, began to appear. Every home missionary pulpit flamed with patriotic fire and summoned its worshippers to arms. Congregations and Sunday Schools were decimated by enlistments. From a careful inquiry made near the close of the War it was ascertained that the home missionary churches of the entire West, on both sides of the Mississippi, «had sent into the army one in four of their entire male membership, including in the count old men, invalids, and boys.» Commenting on this fact that peerless interpreter of history, Richard Salter Storrs, was moved to declare in his Brooklyn pulpit, «Home Missions saved this country once, and will save it again if necessary.»

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Missions, Roman Catholic Church, Home and Foreign. A complete account of the Missions in the Roman Catholic Church would be coterminus with the history of the growth and progress of Christianity, for the Church is essentially missionary. The commission that was given to the Apostles, by the Founder of Christianity, was not to establish a system of philosophy, nor even to maintain a ceremonial form of worship, but it was: «Go ye into the whole world and preach the gospel to every creature.» For the first time in the history of the world was there conceived a project of forming a worldwide institution, that would embrace all nations under one headship, no matter how divergent their ideas or their racial traits. The measure of the universality of the Redemption was the fact that the Church was not to be national or racial, but it was to be Catholic or Universal, for all peoples and for all ages. It was designed to be the continuation of the beneficent work of the Incarnation of the Son of God «unto the consummation of all things.» To create this worldwide institution, the primary business of the Apostles, and their successors, was to preach the gospel to every creature, and the highest vocation of the Church therefore is the missionary vocation.

It would be difficult, then, to give anything but a meagre sketch of the efforts that were put forth to widen the saving influences of the Church, and the ultimate crystallization of the fruits of these efforts into the marvelously complex organization, whose centre is in Rome and whose ramifications extend to the uttermost ends of the earth.

The history of the work of the Missions begins on the first Pentecost in the market place of Jerusalem, wherein were gathered representatives from all the nations of the earth. The providence of God had prepared the time and the place through a thousand years of effort, first by preserving the monotheistic idea of God among the Jews, second, by importing Greek culture and intellectuality (it was no mere accident that led to the translation of the sacred writings of the Hebrews into the Greek Septuagint), and third, by creating the great civil organizations of the Roman Empire, whose well-made roads led to the pillars of Hercules on the west and to the waters of the Danube on the east and beyond. The same providence of God that had prepared the soil, selected the special psychological moment for the seed-sowing, and on the first Pentecost, Peter stood up in the midst of that throng in the market place, and preached the first great missionary sermon, a verbatim report of which is given to us by Luke the Evangelist and in Greek, too, that all the world might read it (Acts ii.). There were 3,000 converts made that day. The same chronicler tells later on of the missionary journeys of Paul and of the many neophytes that were baptized into the Church. Finally both Peter and Paul came to the city of Rome, and there the Prince of the Apostles set up his throne under the shadow of the throne of the imperial Cæsars, and there it has remained ever since, and out from Rome, and with the authority of the Roman Pontiffs, have gone the missionaries that have converted the heathen world to Christianity. Into Italy they went, and beyond into Gaul and Hispania and into the forests of Germany, and along the Danube into the regions of Eastern Europe. Before three centuries went by, the missionaries with Roman Catholic ordination celebrated the divine mysteries and with Roman Catholic consecration exercised ecclesiastical jurisdiction, and after they had preached Roman Catholic doctrine and had gathered the fruits of their labors, they brought them to the feet of the Roman Pontiff for his blessing. A good type of this work is seen in the conversion of Britain. Pope Eleutherius (178 A.D.) sent Fugatus, and Damianus to Britain at the request of Lucius, a British chieftain, and an incipient hierarchy was established. (Bede. I., ch. iv.); (Tertullian, 'Adv. Hær.' I.)

During the persecution of Diocletian (303 A.D.) many Christians in Britain were done to death and the British Martyrology was headed by the illustrious Saint Alban. The happy effect of the change that was wrought by the edicts of Constantine was a source of joy in Britain, because Constantine's mother, Helena, was the daughter of a British prince, and his father, Constantius, was converted and died in the faith at York in Britain. (Euseb. in 'Vitæ' 17.) When the Pelagian heresy began to disturb the faithful of Britain at the instance of the deacon Palladius, Pope Celestine sent Germanus of Auxerre, in his own stead, to drive out the heretics. (Saint Prosper's 'Chronicle,' 429 A.D.) So with more or less fervor of piety (Gildas ch. vii.) Britain preserved the faith of the Roman Catholic Church, "entire, and inviolate" and maintained the succession of British bishops up to the time of Saint Augustine, whom Pope Gregory the Great (597 A.D.) sent to England to convert the Anglo-Saxon, and for a thousand years afterward all spiritual jurisdiction was from Rome.

The same story is true in Ireland: Saint Patrick was sent by Pope Celestine; Saint Boniface went into Germany with a similar message and authority; and in a like way Denmark and the Scandinavian peninsula were brought in subjugation to the yoke of Christ. The missionary went first, and as has been done in India and in China in the 19th century, then gradually the native churches began to grow in numbers, a bishop was sent with consecration and authority from Rome, and the nascent church assumed definite organization until in the course of time it grew into hierarchical perfection. Looking at the missionary work of the Roman Catholic Church from one point of view, there are no Foreign Missions, because she is a worldwide organization, at home in every land.

This work of evangelizing the countries of Europe went on with more or less ardor all through the Middle Ages. The barbarian races rushed in at the breaking up of the Roman Empire and while the military power was too weak to stem the onward rush, still the spiritual masters of the Church met them and chastened their fierce, warlike spirits, and made them submissive to law and order. The vast monastic system grew up. Canon Farrar says:

> Under the influence of Catholicism the monasteries preserved learning and maintained the sense of the unity of Christendom. Under the combined influence of both, grew up the lovely idea of chivalry molding generous instincts into gallant institutions, making the body vigorous and the soul pure, and wedding the Christian virtues of humility and tenderness to the national graces of courtesy and strength. During this period, the Church was the one mighty witness for light in an age of darkness, for order in an age of lawlessness, for personal holiness in an epoch of licentious rage. Amid the despotism of kings and the turbulence of aristocracies it was an inestimable blessing that there should be a power which by the unarmed majesty of simple goodness made the haughtiest and boldest respect the interests of justice, and tremble at the thought of temperance, righteousness, and judgment to come.

The crusades were but great witnesses to the missionary power of the Church, and they did not a little to break the power of Islam, and save Europe from Mohammedan blight. In the 11th century came the great preaching orders, notably the Dominicans, and the Franciscans, and for the next three centuries the voices of these missionaries were heard in every corner of the civilized world. The fall of Constantinople and the consequent spread of the city's learned men through the West was a new leaven to awaken the European mind, and the invention of the astrolabe, together with the art of printing from movable types, gave a new impetus to the missionary movement. Columbus was filled with this spirit, and one of his deepest purposes was to find a shorter way to India and the East in order to bring the gospel to the people who sat in darkness and in the shadow of death. His expedition from Palos was a profoundly religious affair, and on his return from the newly discovered continent, he brought six dusky savages, who were duly instructed and baptized, and Queen Isabella stood at the font of baptism as their godmother. These six converts to Catholicism (1498) have become the 14,000,000 Catholics of the United States to-day. Other discoverers followed Columbus, and while their voyage was in many instances a search for the «Golden Fleece,» yet they invariably brought with them missionaries, and wherever they landed their first act was to erect the cross, and gather the natives to listen to the tidings of salvation. The Cabots planted the cross on Cape Cod 120 years before the landing of the Puritans at Plymouth Rock. Champlain, who, as Bancroft says, «considered the salvation of one soul more important than the conquest of an empire,» opened the Northwest to civilization. Cortez introduced missionaries among the Indians of Mexico; and La Salle, who had been trained in a Jesuit novitiate, brilliant, restless, daring, went by the way of the Great Lakes and down the Mississippi, and opened the West to missionary effort.

While the stories of the wonderful Western world were being whispered in Europe a little knot of ardent spirits gathered about Ignatius Loyola at Paris and plighted their vows to work for God. One of the number was Saint Francis Xavier, who within two decades preached to and baptized hundreds of thousands in India, and penetrated to the very gateway of China. During the 16th century fierce religious dissensions broke out in Europe, and the German and English nations were lost to the Church, but the Jesuit missionaries, together with the Franciscans and Dominicans, made a mighty recompense for the losses in Europe by the gains they secured in India among the Brahmans, in China among the Confucianists, in South America among the Indians, and in North America among the savages.

The 16th and 17th centuries were marvelous in the record of missionary triumphs. China had been a sealed book for 2,000 years, but «Where neither merchant nor traveler has penetrated the Roman Catholic missionaries have found their way.» (Gutzlaff, ‘China Opened,’ Vol. I., ch. vi.) They brought to Europe exact knowledge of the hidden empire and they did it in defiance of every menace of torture and of death. In 1583 Father Ricci landed at Canton, and for 27 years, in the habit of a Bonze or a Literati, he pursued his way to the imperial throne, and baptized many princes of the reigning family. When he died, there were more than 300 churches in the different provinces (Gutzlaff, ‘History of China,’ Vol. II.), and by his public interment, with the emperor's official sanction, Christianity was legalized in China (Abbe Huc, Tome II.). He was succeeded by Father Adam Schaal, S. J., who taught the Chinese all they know of mathematical science, and later on by other missionaries. The storm of persecution came and «more than 300 churches were either destroyed or converted to profane uses, and more than 300,000 Christians were abandoned to the fury of the heathen» (Du Halde). The story of their dreadful sufferings, their fierce tortures, and their agonizing deaths reads like the acts of the martyrs in the early Roman persecutions. In the meantime the evangelization of the Philippines was going on. Three centuries of effort has left six millions of the Malay race deeply imbued with the principles of Christianity, so that Peyton (Episcopalian) was able to write of them:

> I found in all the towns a magnificent church. I attended mass several times, and the churches were always full of natives, even under unfavorable circumstances, on account of the military occupation. There are almost no seats in these churches, the services lasting from an hour to an hour and a half. Never in my life have I observed more evident signs of deep devotion than those I witnessed there — the men kneeling or prostrated before the altar, and the women on their knees or seated on the floor. Nobody left the church during the services, nor spoke to any one. There is no sectarian spirit there. All have been instructed in the creed, in prayer, in the ten commandments, and in the catechism. All have been baptized in infancy. I do not know that there exists in the world a people as pure, as moral, and as devout as the Filipino people. (Report of Philippine Commission.)

South America, too, had been traversed by the missionary, and the Indians of the Andes as well as the wild tribes of Paraguay had accepted the religion of Christ. Whatever the races of South America and of Mexico know of Christianity to-day, they have learned it from the missionaries of the Roman Catholic Church.

Since the year 1622 the work of the «Missions» has been so specialized as to make it a department of Church Administration. In that year Pope Gregory XV. canonically instituted the Congregation de Propaganda Fide, and gave to it the duties of church extension. The Cardinal Prefect of the Propaganda is second only to the Pope himself in power, for he has jurisdiction over all so-called missionary countries. The present prefect, the venerable Cardinal Gotti, is assisted by 25 other cardinals, and as many consultors, making a quasi-senate for the administration of church affairs. Affiliated with the Propaganda there are half a hundred colleges and seminaries for the education of the natives of the missionary countries, and in these colleges most of the languages of the civilized and uncivilized world are taught. The Propaganda had a polyglot press for the printing of literature.

In 1862 Pope Pius IX. instituted a special congregation for the affairs of the Oriental Churches, for the Roman Catholic Church exercises a jurisdiction not only in Europe but over portions of the ancient Eastern Churches whose beginnings are traceable to the Apostles other than Saint Peter, and claims a jurisdiction over them all through the primacy of Saint Peter. These Churches in communion with the Pope are united in a complete doctrinal life, that is, all and every one of the dogmatic teachings of the Roman Catholic Church are accepted by the adherents of these Eastern churches, though they are permitted to retain their ancient liturgies which may be peculiarly their own, and they are not obliged to conform in all matters of discipline, as, in some instances, a married clergy is permitted among them. A distinction has always been made between the acceptation of the dogmatic formularies and the toleration of varying rites and ceremonies. In the former the Church is most exacting, she never permits the least variation in the letter or the spirit of her teaching, but like an indulgent mother she permits her children to maintain their time-honored customs, liturgies, and languages.

The Oriental Rites, under the administration of the Propaganda, are as follows:

1. The Ethiopian or Abyssinian Rite, principally in the Abyssinian Church, first planted by Saint Matthew, increased by Saint Frumentus, in the 4th century, was represented at Council of Florence 1445,— principal missionary of modern times Joseph Sapeto. It includes 30,000 souls.

2. Armenian Rite — gospel first preached by Gregory the Illuminator, though the modern Church was reorganized by constituting the Bishop of Cilicia as Patriarch of the Armenians. The liturgy is in ancient Armenian. It includes 109,000 lay members and 357 priests.

3. Coptic Rite — Church first established by Saint Mark, disciple of Saint Peter and bishop of Alexandria in Egypt. The people went into schism under Dioscorus, but later on were restored to the unity of the faith. The bishop of Alexandria is the patriarch; 22,500 members with 44 priests.

4. Greek Rite — subdivided into (1) Pure Greek in which the Greek language alone is used; (2) Rumanian Greek; (3) Bulgarian Greek, using the Slav language; (4) Ruthenian Greek, and (5) the Melchite Greek. The entire Greek rite in communion with Rome numbers 4,645,803 members with 5,251 priests. They have numerous seminaries and educational institutions.

5. Syriac Rite, subdivided into (1) Pure Syriac; (2) the Syro-Chaldaic; (3) the Syro-Malabaric, and (4) the Maronites. The Syrians number 626,029 with 1,171 priests. All these Oriental Rites together make a total of 5,433,332 members under the administration of many bishops and 6,823 priests. Many of these Eastern Churches have their seminaries for the training of their missionary priests in the city of Rome. Under the jurisdiction of the Propaganda, according to the official statistics published in 1898, there are:

Oriental Churches — 5,433,332 members, 6,825 priests.

Occidental Churches — 27,218,297 members, 33,148 priests.

The latter are distributed as follows:

	Members	Priests
England	1,362,489	2,674
Scotland	373,500	432
Ireland	3,547,079	3,445
Norway Sweden Denmark	9,750	74
Holland	1,854,340	3,168
Balkan Peninsular	686,210	890
Greece	34,710	109
Turkey	129,680	310
Persia	7,650	11
Arabia	1,500	11
India (Eng.)	1,870,000	1,180
China Indian (Peninsular)	827,680	823
Malay, Borneo, Java, Siam	57,890	89
Chinese Empire	532,448	1,168
Korea and Japan	84,410	772
Africa	458,170	1,015
British America	2,187,480	2,766
United States	9,479,250	10,049*
West Indies	339,200	195
Patagonia	99,500	70
Australia	704,170	736
Polynesia	196,850	348

* 11,289,710 population and 12,968 priests.— Official Directory.

This list does not include the Philippine Islands, Porto Rico, Cuba, Mexico nor any of the South American countries, as these countries were ancient dependencies of Spain, and therefore not under the Propaganda. The total aggregate under both branches of the Propaganda or the Missionary department of the Roman Catholic Church at the close of the century was over 32,000,000 with about 40,000 priests.

This statement does not take into account the large army of teaching orders of brothers and sisters, and native catechists, nor does it give any estimate of the educational institutions, hospitals and orphan asylums that are under the auspices of the Church in these countries. Some idea of the growth of the missionary work of the Church may be realized from the fact that at the beginning of the 19th century there were only 5,000,000 under the jurisdiction of the Propaganda, at the beginning of the 20th century there were over six times that number.

This account will be incomplete without some statement of the material resources by which the missions have been carried on. The Congregation of the Propaganda has vast funded resources amounting to $135,000,000, the revenues of which are applied to the support of the work and the colleges under its care. Beside this there have grown up during the 19th century many auxiliary societies; the principal one is known as the Lyons' Society for the Propagation of the Faith. It began with the idea of assisting the poverty stricken missions in New Orleans under Bishop Dubourg, but it soon broadened its scope. It asked only a cent a week from its members, and during its existence (1822–1900) it has gathered and spent $65,690,017. The 'Annals of the Propagation of the Faith,' the official organ of this society, is now issuing 300,000 copies every two months and in 12 different languages. There are 58 different religious societies of priests engaged in the work of the missions, together with 82 orders of Brothers who have no aspirations to the priesthood, yet are consecrated to missionary work, and 434 different orders of religious sisterhoods. These 574 different societies embrace a membership numbering very nearly 100,000 who have left all that this world holds dear, of houses, land, country, and the pleasures of the domestic hearth, and have sacrificed their lives in poverty, celibacy, and exile for the souls of the heathen and the unevangelized. Their consecration to this life is not for a few years, but they count it their greatest joy to spend and be spent till death comes, that the blessed name of Jesus Christ may be better known and more deeply loved.

Under the caption of Home Missions, a short account may be given of the missions to non-Catholics in the United States. The idea of the need of organized effort to present the teachings of the Catholic Church to the American people, is what brought together five priests, Isaac Hecker, Augustine F. Hewit, Clarence Walworth, Francis Baker, and George Deshon, who founded the organization known as the Paulist Fathers (q.v.). This idea was practically systematized in its present form by Rev. Walter Elliott, in September 1893, when he began, in Michigan, a series of missions in public halls and churches for the purpose of explaining the doctrines of the Catholic Church. These missions to non-Catholics prohibited controversy and invited the spirit of inquiry by placing a «Question Box» at the door, into which were dropped all questions concerning the teachings of the Church which anyone desired to have answered. During the last 10 years the work has grown to vast proportions. While the Paulists inaugurated the movement in the United States, yet the work is the normal work of the Church, and therefore belongs to every branch of the service, particularly to the diocesan clergy. The leaders of the movement contemplate the placing in every diocese a band of talented preachers whose business will be extra-parochial, and whose duties will be to go into the towns and country places where the Church is weak, or does not exist, and arrange for the inauguration or strengthening of Church organizations. This band of diocesan missionaries will largely do the duties of a Church extension committee in the spiritual and missionary sense. The growth of this «Home Missionary Movement,» after 10 years, has been such as to necessitate the building of the Apostolic Mission House, at the Catholic University at Washington. This institution will provide special lectures and instructions in missionary methods, and in this way will give training to the diocesan missionary. The legal organization which is financing the work, is the «Catholic Missionary Union,» incorporated under the laws of the State of New York. Its president is the archbishop of New York, *ex-officio,* and there are six other directors. The practical effect of 10 years of this home mission work has been to give the American people a more correct view of the teaching and spirit of the Catholic Church, to eliminate antagonisms, and to make Church relationships more harmonious. It has also tended to increase, and this in no small degree, the stream of converts that has been flowing into the Church.

The growth of the Roman Catholic Church under the jurisdiction of the Home Missions during the last one hundred years has been one of the marvels of the 19th century. The following figures give some measure of it:—In 1800 there were 40 priests; in 1830 the number increased to 232; in 1850 to 1,800; in 1906 to 15,177. In 1800 the Catholic population was 100,000, in 1910 it is estimated at not less than 14,000,000. In 1800 there were but 25 churches; in 1910 there are 17,000. The value of church property, as given by census reports in 1850, was $9,256,758; in 1860 it was $26,774,119, a ratio of increase of 189 per cent, while the aggregate wealth of the country increased only 125 per cent. In 1870 it was $60,985,565. In 1906 value of church property had risen to $292,638,000.

While this external growth indicated by numerical strength and material wealth is very remarkable, the internal growth indicated by evidences of maturing organization as well as by signs of increasing spirituality, is none the less remarkable. The first flowering of the Church's inner life is the vocations to the religious orders whereby men and women accept the call to the life of the evangelical counsels. In 1790 there was one convent with less than 10 religious, in 1909 there are over 5,000 convents with more than 60,000 religious. This army of men and women devote themselves without hope of worldly gain to the alleviation of the ills of humanity in the hospitals by the sick bed, in the tenements of the poor, in the slums among the depraved, in the asylums caring for the orphans and among the aged, who have been stranded on life's shore, without one cent of salary, contenting themselves with meagre fare, with short hours of sleep on a hard bed, and long hours of prayer and devotion to the sick and the poor and the wretched, because they know and are convinced that their reward will be very great in heaven. Many of these religious communities are offshoots of orders that have been established in the old country, but some are indigenous to the American soil. Noteworthy among the communities of men are the Paulist Fathers, founded by five converts, and among the women the Sisters of Charity, founded by Mother Seton, also a convert.

The growth in the Church in the United States of course is principally due to the great stream of emigrants, but not the least element of growth and present strength is the large number of converts who have been drawn to her through the conviction that she is the one Catholic and Apostolic Church. There are no accurate statistics of yearly conversions, but Cardinal Gibbons puts it in this way: «If the same ratio of conversions is preserved throughout the country as exists in the archdiocese of Baltimore, the yearly number of conversions would amount to 44,800 souls. To sum up the aggregate number of Catholics under the American flag is as follows: United States (Cardinal Gibbons' estimate), 14,000,000; Philippines, 6,600,000; Porto Rico, 980,000; Hawaii, 33,000; American Samoa, 3,000; Guam, 9,000, making a total of 21,625,000 souls under the jurisdiction of an apostolic delegate, a cardinal, 13 archbishops and 87 bishops.

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Missis'aga Indians, an American tribe of the Algonquian family residing in Ontario, Canada. The name refers to the eagle. They signed a treaty in 1764 with an eagle as their tribal mark. In 1746 the tribe was admitted to the Iroquois confederacy. There are upward of 600 of the Missisagas remaining. They live on small reservations in Ontario, are mostly Methodists, and are healthy, progressive, peaceful citizens.

Mississippi, one of the southern United States and the seventh admitted to the Union; situated between lat. 30° 13′ and 35° N., and long. 88° 7′ and 91° 41′ W.; extreme length, north and south, 332 miles; average breadth 142 miles, varying from 78 miles below lat. 31° N., to 189 miles on that parallel, and 118 miles on the north line; area, 48,610 square miles, being 1.61 per cent of the territorial extent of the United States. It is bounded north by Tennessee, east by Alabama, south between the Alabama line and Pearl River by the Gulf of Mexico, and from the Pearl to the Mississippi on the parallel of 31° N., by the State of Louisiana; and west by Louisiana and Arkansas, having below lat. 31° N. the Pearl River, and above that line the Mississippi, as the dividing lines. The Round, Horn, Ship, Deer, Cat, Pois, and several other islands lying outside of and forming the southern limit of the Mississippi Sound, belong to this State. It was admitted to the Union 10 Dec. 1817, and takes its name from the river which forms its western boundary for a distance of over 500 miles. There are 75 counties in the State. Pop. (1910) 1,797,114. The capital city is Jackson.

Topography.— Mississippi lies in two divisions, separated by a low broad watershed, the eastern rivers flowing into the Gulf of Mexico, and the westernmost streams emptying into the Mississippi. East of the ridge the surface of the State consists of broad rolling fertile prairies, the ridge itself is rolling and broken into narrow valleys where streams afford plentiful water supply, while to the west the land falls away into the low swampy lands of the Yazoo and the Mississippi rivers. The State is very low, the highest altitude being but 1,000 feet. The coast has a shore line on the Gulf of Mexico of 88 miles, or including the irregularities and islands, of 287 miles. In the eastern part of the State the prairies are covered with grass during the greatest part of the year. East of this prairie region extends a level but very fertile tract on the upper course of the Tombigbee River. In the northern district is a range of hills of moderate elevation, well wooded but devoid of undergrowth. These hills find their western limit in the Walnut Hills; and west of them, and between them and the Mississippi River, in about lat. 32° 30′, for a distance of more than 170 miles, north and south, and 60 miles extreme east and west, the country is occupied by immense bottom lands, produced and fed by the inundations of the Mississippi, constituting the so-called «Delta.» Nearly all of this low region has been reclaimed by a system of levees, and is now rapidly being opened up and settled, and penetrated by railroads. The bottom lands are about 7,000 square miles in extent.

Rivers and Lakes.— Mississippi is well watered by the Homochitto, Big Black, Yazoo, Sunflower, and Tallahatchie rivers, all emptying into the Mississippi, and the Pearl, Pascagoula, and Tombigbee, all emptying into the Gulf of Mexico. There are many small streams in all parts of the State, which, though inferior in capacity to those already noticed, are locally important, watering extensive districts and giving fertility to the soil. In the bottom lands are numerous lakes, bayous and channels, and in this district, along the Mississippi, levees are built by the State partly from a fund derived from a special tax on the land, and partly with moneys derived from the sale of swamp lands.

Climate.—The State lies in what is called the semi-tropic climate belt. The winters are short and mild, the mean temperature 45° F.; the summers are devoid of intense heat, the mean 81°, seldom reaching 100°. Ice from one to two inches thick forms in the northern part of the State. The elevation of the surface and the Gulf breezes render the climate delightful during most of the year. The annual rainfall ranges from 48 to 58 inches. The death rate is very low — 12.9 in 1,000. The heaviest rains occur in late winter or early spring, when the warm Gulf winds meet the cold north winds. The average wind velocity for the whole year is seven miles per hour; the prevailing wind for January is north, while it is south for July.

Geology.— Mississippi is occupied wholly by deposits of the Tertiary and Upper Secondary formations, which, sweeping around from the southern Atlantic States, attain here their greatest width. Near the Gulf of Mexico the sands and clays of the latest periods are spread over the country, and further north the deposits gradually become of greater age. At Vicksburg the Eocene appears at the base of the river bluffs, and the upper portion of these is covered by a deep deposit of yellowish loam or loess, containing fresh-water and land shells. This extends over the country eastward, and attains a thickness of 60 feet or more. The Upper Secondary appears near Jackson, and occupies the northern portion of the State. Fossil remains of a gigantic marine animal resembling the alligator are found in the prairie regions. In 1909 the clay products of Mississippi amounted in value to $798,350. There were six mineral springs reported, with an output of 257,200 gallons, valued at $52,780.

Minerals.— Mississippi is not a mining State. Clay is the principal product, together with marl, phosphate rock, hydraulic lime, gypsum and coal. None of these minerals are worked to any considerable extent.

Flora and Fauna.— There are over 100 species of trees in the State, including 15 varieties of oak. There are cypress, poplar, long-leaved pine, tupelo, sycamore, persimmon, magnolia, holly, cucumber tree, sweet gum, black-walnut, and various species of hickory, elm and maple. Wild animals, such as the deer, puma, wolf, bear, and wildcat are still occasionally seen. Alligators occur in the Mississippi as far north as the mouth of the Arkansas, and in some of the smaller rivers; and most of the streams abound in fish. Paroquets are seen as far north as Natchez, and wild turkeys are still common.

Forestry.—There are about 32,000 square miles of timbered land in the State. The yellow pine ranks first among the forest trees, and extends northward from the coast for 150 miles. The hills, or bluffs along the Mississippi Delta, extend to the prairie lands on the eastward, and afford numerous forests of oak, gum, poplar, tulip, ash, maple, and hickory, and a few pine trees. The prairies of the southern part are covered with the long-leaved pine. Only within recent years has the timber product been important. Nearly all the timber cut in 1900 consisted of yellow pine, and oak and other hard woods. Turpentine, resin, and other naval stores are no small portion of the product from the timber belt.

Agriculture.— The fertility of the soil and a favorable climate give to Mississippi eminent advantages as an agricultural State. Nowhere in the world are there such alluvial lands as the Mississippi bottom, or «Delta,» contains — an alluvial plain in a mild climate, level as the surface of the ocean and of inexhaustible fertility; and this plain is only a small part of the fertile lands of the State. The table-lands of the north, the loams along the bluffs and banks of the Mississippi, the dark and heavy prairie lands, and the inland bottoms are of scarcely less fertility. The prairies, especially in the Tombigbee district, furnish excellent pasturage. Sugar is produced in the south, and cotton forms the great staple of a large part of the State. Maize and oats are grown everywhere, and wheat is sometimes, though not commonly, grown in the northern districts. All the fruits of temperate climates grow here in perfection; plums, peaches, and figs are abundant, and in the south the orange. The farms of Mississippi numbered about 273,820 in 1910, and were valued at $330,295,000. Of this amount, $79,580,000, or 25 per cent, represents the value of buildings, and $250,715,000, or 75 per cent, the value of land and improvements other than buildings. The value of farm implements and machinery was $16,726,000, and of live stock $50,000,000. These values, added to that of farms, give about $400,000,000 as the value of farm property. About 40 per cent of the farms of the State were operated by white farmers and 60 per cent by colored farmers. Of the white farmers, 65 per cent owned all or a part of the farms they operated and 34 per cent operated farms owned by others. The corresponding percentages for colored farmers are 17 and 84 respectively.

The following table shows the acreage, qualities and values of the principal farm crops for 1900 and 1910:

Crops	Acres	Bushels	Value
Corn (1910)	3,232,000	66,256,000	$41,741,000
Wheat (1910)	5,000	70,000	81,000
Oats (1910)	175,000	3,360,000	1,848,000
Cottonseed (tons, 1900)	....	634,083	6,692,027
Cotton (bales, 1910)	2,897,920	1,313,798	47,340,314
Dry beans (1900)	1,149	11,162	11,672
Dry peas (1900)	69,490	590,537	567,279
Rice (pounds, 1910)	2,800	84,000	59,000
Potatoes (1910)	9,000	765,000	719,000
Hay (tons, 1910)	100,000	142,000	1,732,000
Tobacco (pounds, 1910)	100	55,000	11,000
Peanuts (1900)	5,853	95,738	89,350
Sweet potatoes (1900)	38,169	2,817,386	1,458,490
Onions (1900)	233	26,243	24,058
Miscellaneous vegetables (1900)	50,356	....	2,807,652

The total value of Mississippi crops for 1910 was approximately $85,000,000, with 5,611,000 acres under cultivation. The total value of live stock on farms in 1910 was $42,657,000, of which amount 33 per cent represents the value of mules; 25 per cent that of horses; 15 per cent that of dairy cows; 13 per cent that of other neat cattle; 7 per cent that of swine; 4 per cent that of poultry; 2 per cent that of sheep; and 1 per cent that of all other live stock. The following table gives the number of domestic animals on farms for the year 1900:

Dairy cows	299,318
Other neat cattle	574,038
Horses	229,331
Mules and asses	216,032
Sheep	236,470
Swine	1,290,498

Sugarcane in 1900 was grown by 26,300 farmers on 11,552 acres. From this area they sold 5,914 tons of cane for $23,918, and from the remaining product manufactured 18,930 pounds of sugar, valued at $893, and 1,413,219 gallons of syrup and molasses valued at $618,975. The total value of sugarcane products was $643,786. Sorghum cane was grown by 25,183 farmers on 15,734 acres, producing 3,366 tons of cane, and from the remaining product manufactured 1,162,269 gallons of syrup, valued at $313,365. The total value of sorghum cane products was $323,417.

The fruit product of the State for 1900 was as follows:

	Number of trees	Bushels of fruit
Apples	705,796	249,335
Apricots	5,109	772
Cherries	30,186	2,352
Peaches	1,856,748	252,305
Pears	177,824	36,923
Plums and prunes	689,053	66,793

Population.— In 1910 out of a total population of 1,797,114 in Mississippi, the colored population aggregated 908,000, or 58 per cent of the total. In 1850 the colored population was 52 per cent of the whole. How this condition arose is best illustrated by a table showing the increase in population from 1800 to 1850, as follows:

Years	White persons	Colored Persons		Total Pop.
		Free	Slave	
1800	5,179	182	3,489	8,850
1810	23,024	240	17,088	40,352
1820	42,176	458	32,814	75,448
1830	70,443	519	65,659	136,621
1840	179,074	1,366	195,211	375,651
1850	295,718	930	309,878	606,326

The total population of the State in 1860 was 791,305; (1870) 827,922; (1880) 1,131,597; (1890) 1,289,660; (1900) 1,551,270. Population in 1910, 1,797,114. The largest cities are Vicksburg (20,814 pop.); Meridian (23,285); and Natchez (11,791). Other important towns are Jackson, Corinth, Enterprise, Columbus and Carrollton.

State Government.— The State is governed under a constitution adopted in 1890. The governor is elected for a term of four years, and receives a salary of $3,500 per annum. Legislative sessions are held biennially, beginning on Tuesday after the first Monday of January; but only the quadrennial sessions held in the leap years are unlimited in scope and terms, the other sessions can only deal with revenue and appropriations and such matters as the governor submits to them by message. The legislature is Democratic, each member receiving $400 per

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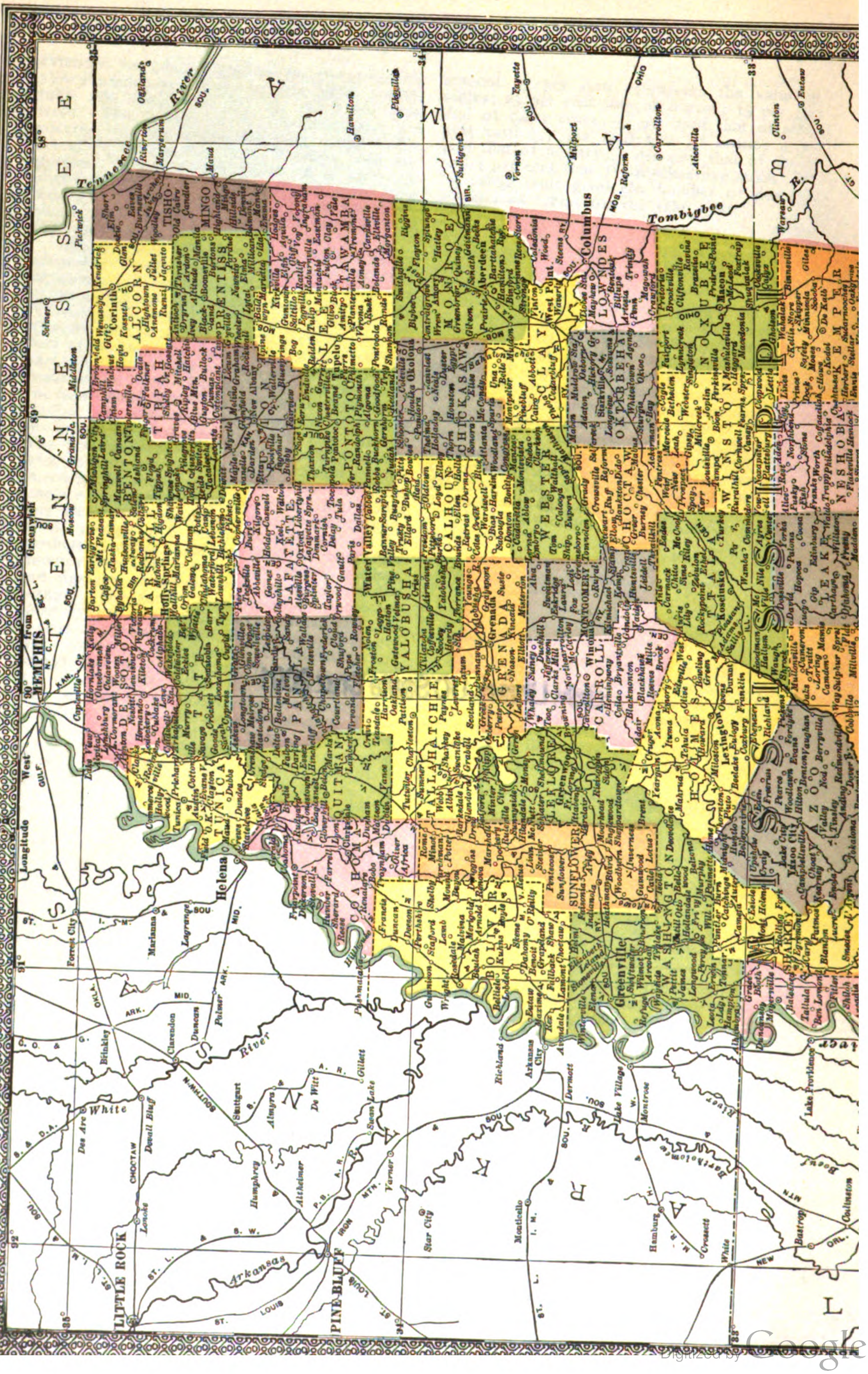
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Columbus
Greenville
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Tennessee River
Tombigbee R.
Arkansas River
White River
TISHOMINGO
ALCORN
TIPPAH
BENTON
MARSHALL
DE SOTO
TATE
TUNICA
PRENTISS
UNION
LAFAYETTE
PANOLA
QUITMAN
COAHOMA
ITAWAMBA
LEE
PONTOTOC
YALOBUSHA
TALLAHATCHIE
MONROE
CHICKASAW
CALHOUN
GRENADA
CARROLL
LEFLORE
SUNFLOWER
BOLIVAR
WASHINGTON
HOLMES
MONTGOMERY
WEBSTER
CLAY
LOWNDES
OKTIBBEHA
CHOCTAW
ATTALA
WINSTON
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KEMPER
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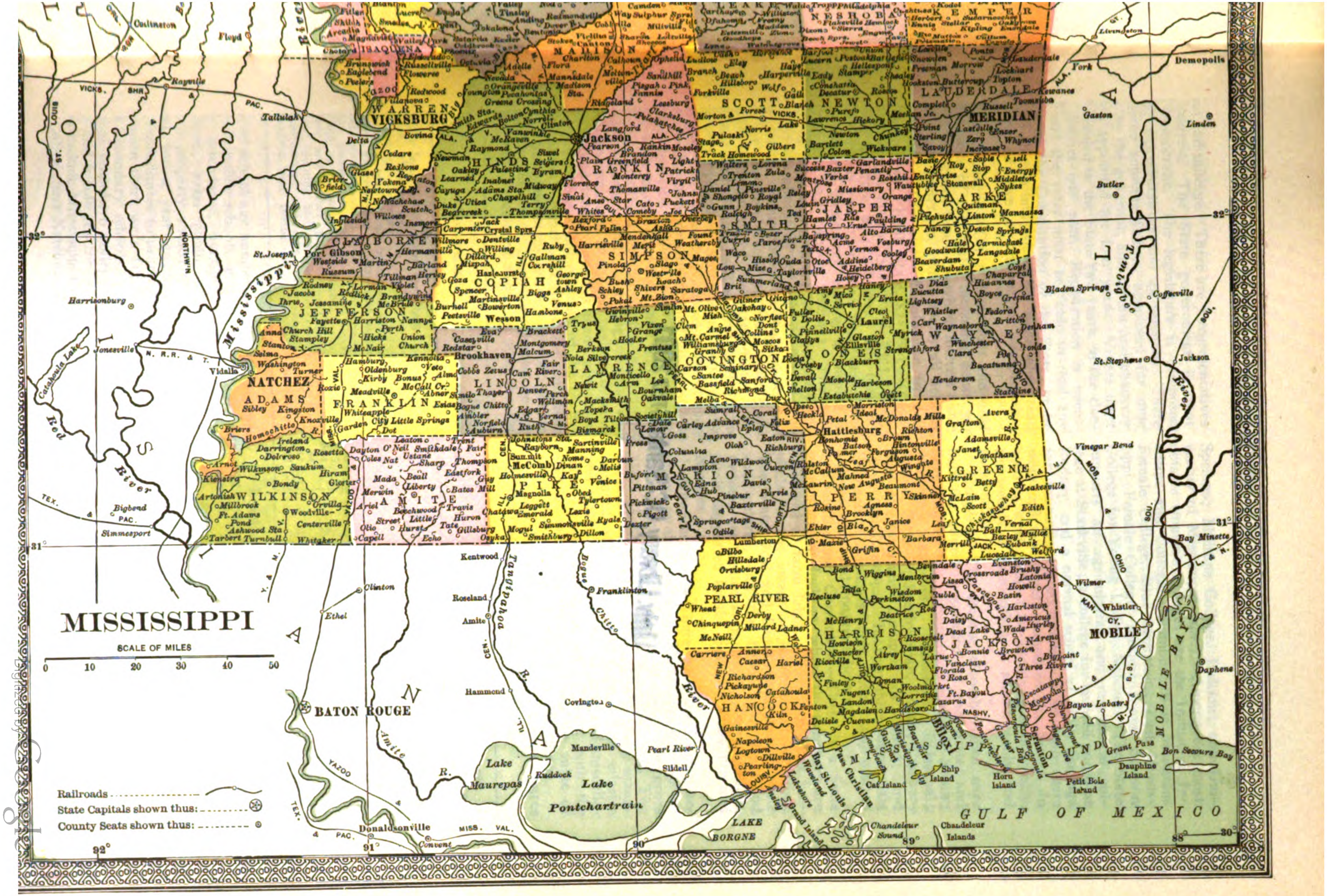

MISSISSIPPI

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annum and mileage. There are 7 representatives in Congress. The State government in 1901 was Democratic. The legislature is composed of 145 representatives and 45 senators. There are three supreme judges, appointed for nine years by the governor, and circuit and chancery judges, appointed for four years. Voters must have resided in the State two years, in the election district one year. Registration is necessary, and the voter must be "able to read any section of the Constitution of the State; or he shall be able to understand the same when read to him, or give a reasonable interpretation thereof."

State Finances.— On 1 Sept. 1901 the total indebtedness of the State, including $2,208,300 of debt for school funds, on which interest alone is paid, was $2,811,300, and is nearly all held by State funds. The assessed valuation in 1910 was as follows: Real estate, $231,889,588; personal property, $109,928,544; total, $393,297,173; and the tax rate, $6 per $1,000. The total receipts for the year 1901 were, $2,436,048; total disbursements, $2,229,996, leaving a surplus of $206,052, and cash balance, $828,453. The main source of income is a direct State property tax, which yields almost 85 per cent of the total income; of the disbursements in 1901, 30 per cent were for common school purposes and 15 per cent for redemption of the State debt.

Banks and Banking.—The first bank in the State was opened at Natchez in 1809. On 30 June 1909, there were 30 National banks in operation, with 3,810 depositors and $1,269,597 in savings deposits. There were also 146 State banks, with 20,092 depositors and $4,149,233 in savings deposits; 4 private banks, with 10,500 savings deposits; and 12 savings banks with 7,640 depositors and $2,002,908 savings deposits. No loan and trust companies made report that year. (See 'Statistical Abstract of the U. S.')

Education.—Nearly all the cities and towns in the State maintain graded schools for ten months in the year. Separate schools are conducted for the colored race. In 1909 the children of school age numbered 598,609; the enrolment in public schools, 466,860; and the average daily attendance, 252,949. There were 9,446 teachers; 7,000 public school buildings and school property valued at $2,000,000. The receipts for a year amount to $1,500,000. and the expenditures to nearly as much. For higher education there were 113 public schools, 17 private secondary schools, 3 public and 2 private normal schools, 6 colleges and universities for men and 6 colleges for women. The men's colleges include Mississippi College, Clinton; Jefferson College, near Natchez; Rust University, Holly Springs; Millsaps College, Jackson; and University of Mississippi (q.v.). Among the most notable women's colleges are the Industrial Institute and College, Columbus; Blue Mountain Female College, Blue Mountain; East Mississippi Female College, Meridian; and Stanton College for Young Ladies, Natchez. The State supports an agricultural and mechanical college at Starkville; a college for colored youth at Rodney, and a normal school at Holly Springs for training colored teachers. In 1910 there were 258 newspapers issued in the State. In 1900 14 were daily, 1 tri-weekly, 5 semi-weekly, 181 weekly, 1 tri-monthly, 11 semi-monthly, and 11 monthly.

Religion.— The Baptist Church claims over half the church population of the State, and then follows the Methodist Episcopal, South; African Methodist; Methodist Episcopal; Roman Catholic; Presbyterian, South; Cumberland Presbyterian; Disciples of Christ; and Protestant Episcopal. In 1900 there were 1,664 Evangelical Sunday-schools, with 11,967 officers and teachers, and 100,000 scholars.

Charities and Correction.—There is a State penitentiary at Jackson, where the prisoners are employed at farm labor. There are State hospitals for the insane at Jackson and Meridian. The State Deaf and Dumb Institute for white and colored, and the School for the Blind (white) are located at Jackson. There are hospitals supported by the State at Vicksburg and Natchez.

Manufactures.—There were 2,598 manufacturing establishments in Mississippi with an invested capital of $72,393,000, in 1909. The gross value of products for 1909 was $80,555,000. The value of materials purchased in a partly manufactured form was $36,926,000. The salaries and wages paid were $22,421,000, and miscellaneous expenses, $9,360,000. These, with the cost of materials, deducted from the value of products leaves a net profit of $11,848,000.

The following table shows the census figures for the leading industries for 1900:

INDUSTRIES	Number of establishm'ts	Capital	Wage Earners	Value of Products
Total for leading industries for State	3,205	$29,210,084	20,072	$31,372,442
Increase, 1890 to 1900	2,242	19,415,871	10,488	18,733,908
Per cent of increase	232.8	198.2	109.4	148.2
Per cent of total of all industries in State	67.2	81.6	76.0	77.6
Cars and general shop construction and repairs	9	741,753	1,534	1,326,401
Cotton ginning	1,901	3,553,853	2,422	2,214,949
Cotton goods	6	2,209,749	1,675	1,472,835
Flouring and grist mill products	225	225,335	208	932,816
Lumber and timber products	844	17,337,538	9,676	15,656,110
Lumber, planing mill products	34	631,553	748	1,315,775
Oil, cottonseed and cake	41	3,711,930	1,521	6,681,121
Turpentine and rosin	145	798,373	2,288	1,772,435

Lumber and timber products form the leading industry, with cottonseed-oil and oil cake second. In 1900, Meridian had the mill of largest capacity, and Greenville the greatest number of establishments. Two establishments, one at Jackson and the other at Meridian, refined as well as expressed the oil. It is claimed that a Mississippian, John Ross, in 1801, made the first written suggestion that oil be expressed from the cottonseed and prophetically named its uses. The first mill in the United States was erected at Natchez, Miss., in 1834.

Cotton ginning has undergone a remarkable development during the decade 1890 to 1900, and now holds third place among the manufacturing industries of the State. There were 3,022 establishments reported in 1910. In 1900 there were 2,422 wage-earners, and receipts for ginning were $2,214,949. In 1890 there were only 130 establishments reported, with 547 wage-earners, and the receipts amounted to $130,387. The increase in these receipts during the decade was $2,084,562, or 1,598.7 per cent.

Transportation.—The total length of railroads within the State in 1907 was 3,760 miles, besides 92 miles of electric railway. The most important lines are the Gulf and Ship Island, the Illinois Central, the Yazoo & Mississippi Valley, the Southern, the Louisville & Nashville, the Kansas City, Memphis & Birmingham, the Mobile & Ohio, the Alabama & Vicksburg, and the New Orleans & Northeastern. Vicksburg, Greenville, and Natchez are principal ports on the Mississippi River, and Pascagoula and Biloxi on the Gulf of Mexico.

History.—Hernando de Soto (q.v.) and his companions first visited the Mississippi region in 1539. They made no settlements, however, and the death of the leader in 1542 put an end to the expedition. In 1682 La Salle descended the Mississippi, took formal possession of the adjacent country for the king of France, and called it Louisiana. In 1698 M. d'Iberville was authorized by the French king to colonize the regions of the lower Mississippi. He landed near Ship Island, and from this point, setting out with two large barges, explored the coast, discovered the mouth of the Mississippi, reaching the bend at the mouth of Red River, and returning to Ship Island erected a fort at the Bay of Biloxi, about 80 miles east from the site of New Orleans. He then embarked for France, leaving the fort in command of his two brothers, Sauvolle and Bienville. In December 1699 Iberville returned, and soon after built a fort on the banks of the Mississippi. In 1700 the Chevalier de Tonty arrived at Iberville's fort with a party of Canadian French from Illinois. Availing himself of De Tonty's knowledge of the country, Iberville despatched a party under his lead to explore the river and its banks. They ascended to the Natchez country, 400 miles above the French fort, and here selected a site for a fort, and called it Rosalie. A settlement was also made in 1703 on the Yazoo River, which was called Saint Peter's. The colonies thus planted grew but slowly, and New Orleans, being founded soon after, drew off a large portion of the colonists from the interior, besides attracting the new immigrants. In 1728 the settlers and the Natchez Indians became enemies, and as a result the latter massacred the settlement and over 200 persons were killed and 500 taken prisoners. The captives were, however, released, and new and stronger forts were erected. Aided by the Choctaw tribes, the French succeeded in destroying the tribe, the greater part of which fell in battle. In 1733 the colony went to war with the Chickasaws, allies of the English, and the conflict continued for several years. There was a peace, followed in 1752 by another Indian war.

In 1762 when Florida was ceded to Great Britain, that part of the present State lying south of a line drawn eastward from the mouth of the Yazoo River (practically from Vicksburg) was claimed to be part of Florida; and when in 1781, Spain conquered Florida, that part of the State came under Spanish rule. In 1798 the Mississippi Territory was created by Congress. Its boundaries were the Mississippi River on the west, the 31st parallel on the south, the Chattahoochee on the east, and a line drawn from the mouth of the Yazoo due east on the north. The Territory having been surrendered to the United States as part of Georgia, the consent of that State had been previously obtained to the establishment of a territorial government. This consent was followed in 1802 by the further cession by Georgia of all her lands south of Tennessee, and these by an act of Congress in 1804 were attached to the Mississippi Territory, which thus comprised the whole of what are now the States of Alabama and Mississippi from the 31st to the 35th parallel. The territory between the Pearl and the Perdido rivers was added in 1811, having been wrested from Spain under the plea that it had originally formed a part of Louisiana. In March 1817 Alabama was separated from Mississippi and organized under a territorial government of its own; and 10 December of the same year Mississippi was admitted into the Union as an independent State. In 1861 it passed an ordinance of secession, took a prominent part in the Civil War, and finally in January 1869 was readmitted to representation in Congress, after ratifying the 15th amendment. The principal battles fought here during the Civil War were those of Corinth, Baker's Creek, Holly Spring, Iuka and the siege of Vicksburg. Amendments to the State constitution were made in 1875 and 1877. The State has had four territorial governors, two provisional governors, one Union Democrat, three Republicans, and 28 Democratic governors.

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EDWARD MAYES,
Author of Educational History of Mississippi.

Mississippi, University of, the State university chartered in 1844 and first opened in 1848, situated near Oxford. During the Civil War (1861–5) all exercises were suspended, and two members of the faculty appointed custodians of the University property. In 1872 the present organization in separate schools with optional studies was adopted, and courses leading to other degrees besides bachelor of arts were offered; in 1881 the law school was established. There are, therefore, now two departments: (1) The Department of Science, Literature and Arts; (2) The Department of Professional Education. The first includes 25 schools grouped into distinct courses or lines of study, providing instruction in the languages, history, science, mathematics, political economy, philosophy, pedagogy and engineering; the degrees conferred are bachelor of arts, bachelor of science, bachelor of philosophy, bachelor of pedagogy, bachelor of mining engineering, bachelor of electrical engineering, and bachelor of civil engineering; there are also post-graduate courses in this department leading to the degrees of master of arts and doctor of philosophy. The second department included in 1903 only the law school. In 1900 the summer term of the University was begun. In 1882 women were admitted to all classes upon the same conditions as men, but were not allowed to lodge on the campus; in 1902 a special home for women students was erected. In the same year additional dormitories were built for men. The library has a special building of modern architecture, and in 1903 numbered 17,000 volumes; there is also a law library of about 2,000 volumes in the law building. Until 1880 the University was supported by annual appropriations of the legislature; since that time the income has been derived from the Federal grant of land, a second township being added to the original grant in 1894; the State has given occasional appropriations for buildings and improvements; in 1910 the income amounted to $45,000. In that same year the students numbered 490, the faculty 46.

Mississippi Agricultural and Mechanical College, founded in 1880, at Agricultural College, Miss. The regular four years' courses offered are the agricultural, mechanical and textile, leading to the degree of B.S., a short course (10 weeks for two years) is given in the winter; graduate courses are also provided; and there is a preparatory department. Women are admitted to all courses. The experiment station is connected with the college, and receives special Federal appropriation; and farmers' institutes are organized by the college and attended by members of the faculty; in 1910 such institutes had an attendance of 2,000. The college was endowed by the Federal land grants of 1862 and 1890, and receives also State and Federal appropriations; no tuition is charged to residents of the State; the income in 1910 amounted to $440,000. The number of students in 1910 was 942; the faculty numbered 60.

Mississippi Bubble, a celebrated financial scheme projected by John Law (q.v.) at Paris in 1717. Law issued shares for a vast company to be called the Compagnie d'Occident, and to be engaged in the colonization and cultivation of the banks of the Mississippi. Reports skilfully spread as to gold and silver mines discovered in these parts raised in the people the hope of great gains. The company soon absorbed those of the Senegal and the East Indies, and took the new title Compagnie des Indes. Such were the hopes raised by this undertaking that the shares originally issued at $100 were sold at 10, 20, 30, and 40 times their value. Law had promised to the regent that he would extinguish the public debt. To keep his word he required that the shares in this company should be paid for one fourth in coin and three fourths in *billets d'état* or public securities, which rapidly rose in value on account of the foolish demand which was created for them. In October 1719 the shares mounted as high as $4,000. The state took advantage of the popular frenzy to issue increased quantities of paper money, which was readily accepted by the public creditors and invested in shares of the Compagnie des Indes. This went on till the value of the paper money in circulation was more than three milliards, while the value of coined money was no more than 700 millions. Before this stage was reached Law himself, who had originated the idea of paper money, had endeavored to check the issue, but his efforts were unavailing. A catastrophe was now inevitable. About the end of 1719 the more prudent speculators began to sell out. In payment of their shares they received, of course, in great part, *billets d'état,* and with these bought gold, silver, diamonds, lands, or anything else having a real value. As the *billets* became depreciated such articles as tallow, soap, etc., were often bought at fabulous prices. Law struggled desperately against the fall in the value of the shares, but all his devices to check their downward course were futile or had only a temporary success, and when the state finally declared that it would receive no further payments in paper, he perceived that all attempts to bolster up the scheme were in vain, and made his escape from France (December, 1720). The affairs of the company were wound up by the state acknowledging itself debtor to the creditors of the company to the amount of $340,000,000. The public debt was augmented by $2,600,000 of "annual rentes."

Mississippi College, in Clinton, Miss., founded in 1826 under the auspices of the Baptists. It has preparatory and collegiate departments. The college courses lead to the degrees of A.B., B.S., and Ph.B. In 1910 the school had 13 professors and instructors, and about 350 students. The library had about 4,000 volumes; the property was valued at $45,000 exclusive of the productive fund of $120,000. The annual income was about $35,000.

Mississippi Levee System, The. The need of a system of levees along the margin of the Mississippi River, in addition to the bank revetment and contraction dikes which are used in the bed of the stream for the improvement of navigation, is that the banks are below the level usually reached by high water. But as they are higher than the land more remote from the river, their overflow results in the submergence of all the lands in the alluvial valley.

The scheme for outlets which has been urged from time to time is impracticable above Red River, where no suitable sites exist, and is to be condemned below Red River, where alone it is possible, notwithstanding the immediate but temporary relief which it might give, because both theory and experience show that when a reduction is made in the size of a river flowing in alluvial soil, or the river is split in two, the smaller rivers gradually take greater slopes than the main river had, and, as the slope begins at the level of the sea, all points in the water surface above will therefore be higher in the divided river than they would have been in a single channel. Hence the relief would be temporary, and, after the time required for adjustment, flood levels would be raised. This would surely occur unless, as is probable, the outlet closed itself by the deposit of sediment. Reservoirs to hold back the floods have been proposed on the Ohio, from which tributary the Mississippi receives the largest contribution to its flood waters, but examination proves them to be too costly and dangerous to be practicable. The opportunities for reservoirs on the upper Mississippi are too limited to have any important effect on the floods of the lower river. It is possible that the scheme of irrigation, on the scale now proposed by the Government on the rivers draining the arid lands may have the effect of abating floods below.

The use of the levee then has been in practice the sole method of restraining the waters of the Mississippi. It began in 1718 when the people of New Orleans built in front of the city a levee three feet high to keep the river back from a fertile alluvial strip. The work progressed slowly up the river during French and Spanish occupation, and even after the Louisiana Purchase in 1803. With the single exception of the grant from the Federal Government of certain swamp lands in 1850, all work on the Mississippi levees until 1882 was done entirely by the States, with no aid from the central government; and this aid, indeed, was purely nominal, as the swamp lands granted had no commercial value and could not be converted into funds to further the construction of levees, but needed the very improvement consequent on the building of levees to make them salable. By 1882, the year of the great Mississippi flood, it had become evident, on the purely physical side of the problem, that the control in the lower course of the river of the drainage from 1,250,000 square miles was too great a burden for the seven riparian States below the junction of the Ohio. In that year the first small allotment was made for levees by the Mississippi River Commission, from the appropriation of $1,300,000, made by Congress for the improvement of the Mississippi River. As far back as 1845, a convention held in Memphis, Tenn., urged that "the improvement and preservation of those great rivers" (that is, Mississippi and Ohio) "are deemed impracticable by the States or individual enterprise, and call for the appropriation of money for the same by the General Government," a resolution passed with John C. Calhoun in the chair and by a body of representative State's Rights men, strict constructionists, and natural opponents of the doctrine of internal improvements. From 1882 in every River and Harbor Bill until 1896, from the appropriations for the improvement of the River, the Mississippi River Commission were allowed to make only such allotments for levees as they considered would benefit navigation. Since that year the bills have made specific provision for the building of levees. Between 1882 and the close of the fiscal year in 1903, the General Government's appropriations have amounted to a little more than $18,000,000, by far the most of it granted since 1891. The States and levee districts up to 1903 spent more than $40,000,000. This amount was raised by heavy State taxes. Thus, in Louisiana by special taxes in the alluvial counties on all real and personal property and products, and by a general tax of one mill on all property in the State, about $2,000,000 is raised annually. This sum exceeds the average granted by the Federal Government for work throughout the whole valley each year. Besides this the State, by its Constitution, grants the free right of way for levees. It has also constructed and maintains about 600 miles of levee on its interior streams without Federal or other assistance. Hence it will be seen that the States have borne much more than their share, and that the appeal for increased appropriations made to Congress by the Inter-State Mississippi River Improvement and Levee Association in 1903 at its convention in New Orleans is a reasonable one. The River Commission estimates that rather more than 94,000,000 cubic yards of levees will be necessary to complete the system; the estimated cost is not more than $20,000,000, and the suggestion of this convention was that the appropriation of Congress be so increased that all this work can be completed in six or seven years.

The justice of such a claim is borne out by the success of the work already done. Any argument based upon this will be of greater force than the mere showing of facts signifies, since these results were attained with imperfect means, that is, with incomplete levees. The floods of 1897 and 1903 furnish a means of comparison. The 1903 flood was greater than that in 1897, but it broke levees only in six places, between Cairo and Red River, whereas the lesser flood of 1897 made 38 breaks. The earlier flood broke down over nine miles of levee; the latter only two and one half miles. The gain due to the levees constructed in these five years is apparent, and it seems logical to argue that upon the completion of the system crevasses will become at least as infrequent as shipwrecks, fires, or railway catastrophes. To some such conclusion the following figures point: the area overflowed in 1903 was 8,000 square miles out of a total of 29,000 square miles liable to overflow. Of these 8,000 miles, 3,000 was from back water through the openings left for the confluence of the tributaries. This may be reduced one third, but cannot be entirely prevented. About 2,000 square miles were overflowed from the present incomplete extension of levees and only 3,000 miles of inundation in 1903 resulted from the failure of the system as far as built. So that, throwing out the area (about 2,000 square miles) which could not be protected by a levee system, no matter how much it was perfected, it is evident that the present levees saved from inundation all but 3,000 square miles out of the 27,000 square miles which are the actual measure of efficiency of the present system. In brief, in its present incomplete condition the Mississippi levee system in a great flood has an efficiency of more than 85 per cent. In years of ordinary high water it approaches 100 per cent.

These figures, which were presented to the Mississippi Levee Convention in 1903, are the more remarkable from the fact that a part of the work has been in the hands of States and Levee Districts, the contracts having been placed by them and the work done after their designs, and that another part has been done by the Federal Government, with all the consequent opportunities for friction and for lack of harmonious plan. It is to be noted, however, that no such disagreements or incongruities as might have been expected have occurred — there having been, in fact, a remarkable concert of purpose and action between the officers of the United States Engineer Corps and the engineers of the local levee authorities who have had executive charge of the work. The designs and specifications prepared by them for levee work have been substantially the same, the controlling purpose having always been to build embankments as rapidly as means become available, at least two or three feet higher than any previous flood water, and of such width and section as experience has proved necessary for stability.

The levees built in the earlier period of construction were frequently low in grade and deficient in section; but, at least since the increase of means for the work due to the aid of the General Government, few levees have been designed or built with grades less than two feet above any previous flood level, or with a less width of base than seven times their height. The standard section approved by the Mississippi River Commission for levees not exceeding 12 feet in height, has a crown, or width on top, of 8 feet, with transverse slopes on both sides of 1 vertical on 3 horizontal. When above 12 feet high a "banquette," or additional base, on the landward side is to be added, extending from a point 8 feet below the grade, or level of the crown, with a slope of 1 on 10 for 20 feet and thence with a slope of 1 on 4 to the ground line; but in general cases this banquette is omitted until the whole line is built to a grade 3 feet above the highest known water. The ground on which the levee is to be built is cleared of perishable material and plowed or spaded, and trees or stumps are grubbed by the roots and one or more search ditches — usually called "muck ditches"— are dug along the line to discover and cut off roots or buried logs. In many of the ancient levees these precautions were either omitted or imperfectly carried out, and in some cases much trouble and danger have resulted from the decay of such material left under these older levees. The embankment is generally made with earth taken from pits on the side toward the river, 20 to 40 feet from the base. The work is nearly always done under contract, by the cubic yard, and formerly was almost entirely executed with spades and wheelbarrows, but now quite as generally with wheeled scrapers. A few levees have been built with power-driven machinery, and it appears probable that such tools and appliances will be more extensively used in the future.

At present there are 1,490 miles of levees reaching from near Cairo, Ill., to Fort Jackson, La., nearly 80 miles below New Orleans. These are continuous, with the exception of gaps at the mouths of the Red, Yazoo, Arkansas, White and Saint Francis Rivers, to allow their junction with the main river. Through these gaps, in season of flood, the waters back up into the tributary basin, overflowing as much as 2,904 square miles now unprotected. The ultimate plan is to close all of them as nearly as possible.

The location of levee lines is necessarily governed to a large degree by the means available for building them. As the land is generally highest on the immediate banks of the river, levees located as close to them as possible are evidently smaller and less costly than those built further from the river on lower ground. But as the banks are more or less subject to erosion and caving in all concave bends, it becomes necessary to place the levees well back from such banks in order to give them permanency. The rate of recession in the past in any particular bend may indicate the probable position of the river bank at a future date and thus determine the expectation of life for a given levee location. It has been a common practice of late years to locate them around caving bends, when time and means were available, so as to give them an expected life of not less than twenty years. But the rate of caving in any bend is extremely variable, and the locus of its maximum often still more so; and hence the life of a levee, as limited by the encroachment of caving river banks, is a matter of uncertainty, however carefully its lines may have been projected; for whenever they are reached by the caving of the river banks they, of course, fall into the stream with the ground upon which they stood. It is estimated that for the past eight years, the yardage annually required to close gaps thus occurring has been about one and a half per cent of the contents of the system as existing. With more ample funds for immediate use the margin between the caving banks and levee locations might, perhaps, be economically increased to give them a probable life much greater than 20 years around almost any bend. Indeed a large part of the line is so located as to appear beyond danger from caving banks for centuries; but sooner or later they must be threatened in many places, however located. The only remedy for this is the revetment of the river banks in such a manner as to prevent erosion and hold them in fixed position. This bank protection would often cost as much as $150,000 per mile, where the average cost of a levee might not be more than $30,000 per mile.

The contention that the confinement of flood waters to the path of the river induces deposits in its bed so that the channel becomes thereby filled and obstructed is not borne out by experience, nor by the innumerable soundings made for many years past by the Delta Survey and the Mississippi River Commission. Moreover, it is not consistent with the result of observation on smaller streams — Red River, for instance — where flood waters have been confined between levees, and the width and depth of the channel coincidently increased, and the flood heights reduced. When the flood waters rise to the top of the natural banks of the river they may then overflow in a thin sheet without materially increasing the flood height in the river. But when this overflow is restrained by artificial banks, or levees, the water must rise higher. The extent of such rise, however, is not at all in like proportion to the volume of discharge. As the water rises the slope to the outfall increases, and also the larger channel occupied opposes a less ratio of frictional resistance to flow than the smaller channel. There is, therefore, a limit to the height of floods when confined between levees depending, when other conditions remain constant, upon their volume. There is reason to believe that the levee system of the Mississippi River as now designed, and under construction, will have a grade and height sufficient to restrain the largest flood volumes that can be expected to come down the river.

A strong attempt to make the question of increased Federal appropriations for the Mississippi levees a national issue naturally followed the passage of the Irrigation Bill, and was voiced in the Levee Convention held in New Orleans, 27–28 Oct. 1903. The Convention urged that the levee was the only solution of the difficulty in the States on the lower Mississippi, no matter what a system of reservoirs and dams might accomplish on the upper courses of the river; argued that the protection and reclamation of land in the South was quite as clearly a case for governmental aid as the reclamation and improvement of arid lands in the West; and estimated that 20,000,000 acres of swamp land could be reclaimed by levee protection and made fit for the production of cotton, rice, cane and maize, at a total cost of $3 per acre; that the levees could be maintained for less than ten cents per acre, and that the work was already two-thirds completed.

H. B. Richardson,
Chief State Engineer of Louisiana.
B. M. Harrod,
Member Mississippi River Commission.

Mississippi River (Ind. *Missi Sepe*, «father of waters,» «great river»), the main stem of the greatest drainage system of North America, and one of the greatest in the world (1,257,000 square miles); draining the entire western slope of the Alleghany-Appalachian range, and all the eastern slope of the United States Rockies save a small southern portion, with all between — 19 States and 2 Territories in all, from New York to Montana, but narrowing considerably in the lower basin. The Mississippi extends nearly the entire length of the United States, from within 100 miles of Canada to the Gulf of Mexico, in a water course of about 2,550 miles, varied slightly by the lower river's bends and cut-offs; and forms the boundary, total or partial, of 10 States — Minnesota, Iowa, Missouri, Arkansas, and Louisiana, on the west, and Wisconsin, Illinois, Kentucky, Tennessee and Mississippi, on the east. It has on its banks four cities with from 200,000 to 600,000 inhabitants (Saint Louis, New Orleans, Saint Paul, and Minneapolis), and 17 others of over 10,000 — Winona, Minn.; La Crosse, Wis.; Dubuque, Clinton, Davenport, Muscatine, Burlington, and Keokuk, Ia.; Rock Island, Quincy, Alton, and Cairo, Ill.; Hannibal, Mo.; Memphis, Tenn.; Vicksburg and Natchez, Miss.; and Baton Rouge, La. It is navigable precisely 2,000 miles (at present) from its mouth to Minneapolis (Falls of St. Anthony), though the end of regular navigation is St. Paul, 13 miles below; and is brokenly navigated by smaller steamers to Leech River, 415 miles farther on, along different reaches. It has about 100,000 tributaries, 240 large enough to figure on small-sized statistical charts, 45 of them navigable for distances varying from 2,300 to 50 miles, and aggregating some 15,700 miles of inland navigation; steamers can go upon it and its tributaries some 4,000 miles east and west without breaking bulk — from Great Falls, Mont., on the Missouri, to Olean, N. Y., on the Allegheny. The greatest of the affluents, the Missouri, is usually considered the main stream, being about 1,600 miles longer than the upper Mississippi above the mouth (4,200 miles from the Gulf, the longest river course on the globe), having a basin more than three times as great, and discharging a considerably larger volume of water annually; nevertheless the upper Mississippi has so much steadier a flow — the Missouri shrinking at low water to 1-48 the volume in flood, and practically unnavigable then — that the former as between the two maintains the permanent navigability of the joint stream, and is justly enough held the main body in popular estimation, besides that the axial valley is continuous. Moreover, the Ohio with its great rainfall (41.5 inches, against 35.2 for the upper Mississippi and 20.9 for the Missouri) discharges far more than either, and if that were valid ground, should itself be held the main stream.

The chief tributaries of the lower Mississippi are as follows, in order of contribution to the volume of water in the lower river: Ohio, 1,300 miles long (to source of Allegheny); width, 1,200 feet at Pittsburg, 3,000 at mouth; basin, 207,111 square miles; annual discharge, about 5,000,000,000,000 cubic feet; per second, 158,000. Missouri, 2,908 miles long; width, 1,500 feet at Fort Benton (head of large-steamer navigation), 3,000 at mouth; basin, 527,690 square miles; annual discharge, 3,780,000,000,000 cubic feet; per second, 120,000. Upper Mississippi, 1,330 miles long; width, 1,200 feet at St. Paul (head of large navigation), 5,000 at junction with the Missouri; basin, 179,635 square miles; annual discharge, 3,300,000,000,000 cubic feet; per second, 105,000. Arkansas, 1,514 miles long; width, 1,500 feet at Fort Smith (head of large navigation), and about the same to its mouth; basin, 184,742 square miles; annual discharge, 2,000,000,000,000 cubic feet; per second, 63,000. Red, 1,200 miles long; width, widely varying from log dams, etc.; annual discharge, 1,800,000,000,000 cubic feet; per second, 57,000. The three next greatest basins are the White, Yazoo, and St. Francis. The total annual discharge, including three outlet bayous, is 21,300,000,000,000 cubic feet, or 675,000 per second.

The following are the distances from the farthest sources on the main stem to the chief landmarks on its course, and the mean-water elevations above sea-level at the end of the reaches:

	Dist., Miles	Elev., Feet
Mississippi Springs, above Itasca, and 6½ miles from outlet......		1535
Outlet at Itasca to outlet at Winnibigoshish Lake	114	1292.8
To Falls of St. Anthony (Minneapolis)	546	782
To St. Paul, Minn.	559	680.5
To La Crosse, Wis.	715	621.2
To Prairie du Chien, Wis.	787	597.5
To Dubuque, Ia................	849	578.2
To Rock Island, Ill.	957	533.7
To Burlington, Ia.	1,039	505.1
To Keokuk, Ia.	1,086	472.3
To Quincy Bridge, Ill.	1,127	453.8
To Hannibal, Mo................	1,147	444.9
To mouth of Illinois River........	1,249	399.4
To St. Louis, Mo.	1,288	384.8
To mouth of Ohio River (Cairo, Ill.)	1,470	275
To Memphis, Tenn.	1,695	201
To Natchez, Miss.	2,177	40.5
To Baton Rouge, La.............	2,310	18.5
To New Orleans, La.	2,435	8
To Fort St. Philip, La.	2,509	3
To head of Passes	2,529	1.8
To Gulf	2,546	
(Or 2,553 miles from ultimate sources.)		

The «source» of a great river is often a term of little import, as its waters may gather from the drainage of a large district; but taking it in its current sense, of the ultimate reservoir of its farthest extension, the Mississippi rises in the basin draining into Itasca Lake (q.v.) in northern Minnesota. Into the west arm flows from the heights, through a couple of small ponds, a stream of considerable power and fulness, called by its discoverer Nicollet the «Infant Mississippi,» and now confirmed as such so far as there is one ultimate stream; and out of it, from the north arm, flows the Mississippi. Nicollet in 1836 found it 16 feet wide and 14 inches deep at the outlet. Government Commissioner J. V. Brower in 1893 found it 50 feet wide and 3 or 4 deep in mid-channel, with a muddy bottom, and a current of about two miles an hour. As the current increases, it narrows to some 30 feet; is filled with debris, shoals, and boulders; and for some distance down the stream, free passage with canoes is impeded by reeds, flag, and water grass. It continues northward with slight falls and rapids, to Lac Travers or Bemidji, about 10 miles long by 4 wide, set in a basin surrounded by forested hills and with a beach of perfectly white sand. Thence it issues on the east, and for 25 miles southeastwardly brawls over a series of rapids, from whose foot it flows in a clear even stream 120 feet wide and 4 or 5 deep to Cass Lake, twice as large as Bemidji; thence on the east six miles to Winnibigashish, still larger, whence it issues again on the east 172 feet wide, and as before grows narrower, deeper, and of swifter current as it drains the marshes and meadows below. Just above the junction with Leech River, the outlet of the noble Leech Lake, the largest in this region,—25 by 15 miles,—it strikes a bed of sandstone with a fall of 20 feet in one sixth of a mile, and is ruffled into rapids called the Falls of Pokegama, in a channel 80 feet wide. This is about 130 miles from the source; small steamers run to the foot of the rapids. Thence it runs crookedly with a general south trend, about 120 feet wide, through hardwood forests, swamps, and sand-hills, covered with glacial gravel and boulder drift. From the entrance of Swan River to that of the outlet of Sandy Lake there are six rapids; the latter lake has a small stream running from a small pond to the eastward, not far from Saint Louis River, emptying into Lake Superior at Duluth, and forms the old canoe route from Minnesota to the Great Lakes. Thence to the entrance of Pine River, about 150 miles from the Pokegama Falls, it has numerous rapids, and is broad enough to enclose several islands; it receives several smaller tributaries; and the powerful Crow Wing River, 47 miles below Pine River, also fed from a district of lakes, contributes almost as much volume to the joint stream as the Mississippi itself. At the Sauk Rapids, a mile long, 133 miles below the Crow Wing, and at the entrance of Sauk River, begin the first rocky banks, of Potsdam sandstone, extending down to Rock Island.

At the Falls of Saint Anthony, 80 miles below, the river descends about 65 feet in three fourths of a mile, forming rapids interrupted in the middle by a precipice 18 feet high; over which the river, now 1,200 feet wide, formerly plunged in a cataract of great beauty and fame. An island divided it into two channels, the western being the larger. Here the water-power has been used to build up the immense manufacturing interests of Minneapolis, and the falls are no more, as will perhaps be the fate of Niagara. Thirteen miles below, a convenient landing has established Saint Paul as the head of continuous navigation for large steamers, and made it the great wholesale distributing point for the Northwest, and onward the valley is richly fertile, very beautiful, and often of much grandeur. Below Saint Paul the river widens into the island-studded «Lake» Pepin. From Davenport, Ia., 943 miles from the source, to Rock Island, 14 miles below, there are rapids of 22 feet fall, formerly obstructing the navigation; the government has now cut a channel in the solid rock. The formation of the bed is peculiar, it consists of stratified limestone, crushed into folds which form a series of six or seven parallel bars across the channel, one to three miles apart. From this point onward, the formation is Carboniferous, and the banks rise into picturesque rocky bluffs sometimes 300 feet high, as far down as nearly to the beginning of the alluvial region, 140 miles below Saint Louis. At the mouth of the Des Moines River, 130 miles below Rock Island, is another rapid of 24 feet fall, now avoided by a ship canal; and between Muscatine and Keokuk is one 12 miles long, with 23 feet descent. Nearly 200 miles below Keokuk the first great change comes to the river. Into this clear placid stream is poured a swift muddy red torrent, at high water of far greater volume than its own, that of the enormous Missouri, creating turbulent eddies, and for many miles flowing side by side with the white northern stream without mixing of waters. The bends and winds of the river, making the current cross from side to side, finally mingling them within 100 or 150 miles. Not quite 200 miles farther on, comes in the mighty Ohio, with a volume over two thirds as great as that of the other two united.

But 30 miles above here, and three miles above the great geological landmark of Cape Girardeau, Mo., begins a still greater change: the vast northern upland, mainly elevated rock with a moderate soil covering it, which has been drained by the river, ceases. The remaining 1,100 miles of its valley is the creation of its own silt; through which it meanders in deep curves and loops and narrow horseshoes, shifting its channel capriciously, continually building up one side and cutting away the other, but rarely twice the same side. Cape Girardeau is an ancient headland of an ancient ocean, into which the silt-laden river poured its deposits as the present river does into the Gulf, and which has receded, leaving more than 1,000 miles of the garden of the world. And the relation of the river to its bottoms is reversed also. From the Falls of Saint Anthony to the end of the uplands, are deep strips of bottom land overflowed at high water; but except at such periods they are above the river. But in the lower bottoms made by the river itself, the surface of the latter is normally *above* that of the bordering lands. The friction of the current on the sides and bottom causes the water held back to keep depositing fresh layers of the heavier sediment on the edges and in the channel; so that as the depth of water remains the same, and the channel continually shallows, the surface of the water must rise, and would at last empty itself did not the same process elevate its retaining walls. The river therefore runs in a groove, cut into a ridge considerably above the surrounding country, its surface much higher and its bed much lower than the region for many miles back; it slopes away with a gradient at first of about seven feet to the mile, decreasing regularly to the outer edges of the flood plain — which at the Ohio is about 10 miles wide, and 50 to 70 in lower Louisiana, widening to 150 at the Delta — and ending at about six inches per mile in the swamps and bayous at the outer edge. The natural method of discharging the waters at flood seasons is to spill over the banks and flood the adjacent country, part of the waters flowing off through semi-river channels (bayous) in the soft earth, the rest remaining in pools and swamps and gradually evaporating; and the attempt to keep it in the same channel which suffices for low water, to comport with the needs of civilized occupancy, has produced an excessively costly battle with nature, of which the success is by no means yet assured or assurable.

The junction of the Red introduces us to still another phenomenon. That great river formerly discharged its main waters to the Gulf through the Atchafalaya "Bayou," roughly parallel with the Mississippi; but that and the Mississippi both sent their surplus waters through an amazing network of lesser bayous, which still penetrate southern Louisiana with thousands of miles of navigable channels. The head of the Atchafalaya silted up and became choked with logs and rubbish, and the Red opened a channel into the Mississippi; late in the 19th century the government dredged out the head of the bayou to make a navigable channel; it rapidly widened to a great river, became again the main channel of the Red, and threatened to ruin a great district of fertile plantations; so that works had to be undertaken to prevent its enlargement. As we approach the place where the Mississippi plain merges in the great coastal plain of the Atlantic, the surface grows lower and the soil spongier; and the river (which above the Missouri is about a mile wide, thence to the Red half a mile to a mile, with occasional reaches of a mile and a half, and below the Red narrows to a width of about 3,000 feet, which it retains with curious persistence) widens to about a mile and a half and enters the Gulf — through the Delta, a quaking, impassable, finally half liquid salt marsh, land in process of making — by three great arms or "passes," of which two ramify still further. These are known as the Southwest Pass, the South Pass (with two arms near the Gulf), and an eastern arm soon dividing into North Pass and Pass à l'Outre.

It should be said, however, that these alluvial bottoms do not quite monopolize the space from the Ohio to the Gulf. Here and there on the east bank there are spots where high solid ground, old capes and peninsulas of the antique ocean, comes down to the river side; as at Columbus, Ky., Randolph and Memphis, Tenn., Vicksburg, Grand Gulf, and Natchez, Miss., and Baton Rouge, La. With one exception, each of these spots has been utilized as a considerable road for the commerce of the interior to the great waterway.

Improvements of the River.— These are broadly divisible into two classes: those designed to improve navigation, and those designed to prevent overflows. The one, therefore, has for immediate object the deepening or equalizing of the permanent channel, the other the raising and strengthening of the banks. To some extent both require common methods, as in stopping off overflow channels; often they are antagonistic, navigation being improved by narrowing the channel, liability to breakage of banks decreased by widening it. The methods of the second have been more used to achieve the first than some engineers think judicious.

At high water the navigation problem presents no difficulty; work should therefore be concentrated on low-water conditions. It must be said that so far, all the notable good, except in case of the jetties at the mouth, has been accomplished by the old-fashioned methods of blasting and dredging; aided by superior modern appliances; and even the jetties would fail of their work without constant dredging. It is obvious that as no more water in total can be furnished to the river, there are but three possible methods of obtaining more at a given spot and time: first, to pond a portion of the flood waters in reservoirs, sluicing it out at low water; second, to concentrate the water where it is needed; third, to level the bed of the stream so that there shall be no undesired ponding behind shoals and bars, and no rock projections. The first has been given up as entirely impracticable: no conceivable artificial reservoir can supply enough water to keep a great river full. The second has two methods. One has been applied with excellent success, not to the main river but to the Ohio, where six locks and movable dams, each costing $800,000, creating pools from place to place, have given six feet of water for some distance below Pittsburg; and 12 more are in contemplation, to extend the system to Marietta. This is the canal system, and a rational one: it may yet be applied to the great river. The improvement of the Missouri in like manner has been discussed; but the excessive lowness of the water in the dry season — but 15,000 cubic feet per second — with the enormous amount of sediment brought down at high water, 1-39th its weight against an average of 1-265th, make it almost hopeless. Another and older method, also excellent, is to narrow the channel and so deepen the available water. As it would not be practicable to build thousands of miles of artificial river channel, effort must be directed to improving the natural one. To this end, it is narrowed by closing off side channels around islands, etc.— stopping up the heads; diking off small bays and inlets; strengthening caving banks; and obstructing the side current by solid spur dikes, set obliquely out into the stream nearly to the channel line. After the entrance of the Missouri, the mass of sediment furnishes a new and effective weapon. Between here and Cairo hurdles of piles and brush are laid along the banks, jetty fashion; the sediment packs into the brush and speedily becomes solid, and the results in creating new banks to narrow the channel have been most gratifying, besides reclaiming large tracts of overflowed bottom lands. Caving banks are protected by mattresses (see JETTIES for their construction); the depth of water being slight, they can be made lighter than in the lower river. Below Cairo the work is of the same nature, but more difficult from the volume of water and the alluvial lands easily crumbling. Here the channel is sought to be narrowed, where it exceeds about 3,500 feet, by mattresses from 800 to 2,000 feet long, and 200 to 300 feet wide, weighted down with rubble stone. But the immense weight of the water, which may be from 60 to 100 feet deep at flood, has forced their continual increase in weight and strength of construction.

The brush and small saplings have been replaced by fascines (solid rods tightly withed together), the binding poles by strong wire; the cost per foot of bank protection has trebled in the last 25 years, rising from about $10 to $30. For closing off side channels and watercourses, rows of piles are driven in, 8 or 10 feet apart and the rows 20, and the upper row interwoven with brush. Caving banks are graded down to a slope, and faced with mattresses; of late, however, rubble stone has been used with better success. On the lower river, where stone has to be brought from long distances, concrete has been experimented with.

Another system, however, has been tried for many years at enormous cost, and is still an experiment — that of levees. (See Mississippi Levee System.) Formerly, under the slave system, each planter along the rivers liable to overflow had rude dikes erected for himself; the importance of the work to neighborhoods led to common town action, then to county and State action. These levee systems, of course, were broken through in floods, but the water rose only to its natural height in the channel, and soon subsided; and to furnish absolute security against overflow would cost not only an enormous sum, but would exceed a hundredfold the capital value of the districts imperiled. When in 1879 Congress appointed the Mississippi River Commission, it forbade them to consider the protection of lands from overflow as part of their work. Nevertheless, a majority of the Commission believed that the levee system could be used efficiently to improve navigation; and estimated that $11,443,000 below Cairo would furnish a complete protection for the banks and double the depth of permanent river channel, by the natural scour of the water as with jetties. Since then, the National government and the States (about half each) have spent over $28,000,000, and it is estimated that $22,000,000 more will be needed to complete the work; the channel has not been improved at low water, except by means not connected with the jetty system; and the level of the river has risen with the levees, over six feet already, and estimated to ultimately reach 11 when the levee system has made a smooth solid bank all the way, with no places for overspill. These levees are from 8 to 14 feet high, with a width on top of 8 feet, and a side slope of ⅓; and are intended to project three feet above high water, but need to be raised every few years as the river rises. There are now about 1,400 miles of continuous levees from New Madrid, Mo., 80 miles below Cairo, except for some 50 miles around Memphis, where there are gaps; and it is estimated that half of this will have to be made 14 feet high eventually. They have to be placed near the banks, to protect riverside plantations and avoid the slope away from the river; and very large amounts of them have to be replaced yearly from cave-ins.

The leveling of the channel bed has perhaps done more for navigation than all the others, except the movable dams. The blasting of a channel through the solid rock bed at the rapids between Davenport and Rock Island, and the cutting of a canal at the Des Moines Rapids, are permanent improvements. In the sand bed below the junction of the Missouri, the best work is steadily done by the pumping dredges, of which there are two between there and Cairo, and nine in the lower river; most of these have a capacity of 1,000 cubic yards of sand per hour, which they suck in through long pipes. They cost on an average $100,000 apiece, and $20,000 a low-water season to operate. Their work can never be done, for the river constantly creates new tasks for them, by the same natural law that created the first one, and creates them in ever new places; but the hope of navigation rests on them. They attack a sand-bar when the water is falling, and cut a channel about 2,000 feet long and 250 feet wide, to a depth of three or four feet.

From St. Paul to the Missouri River, where at low water there is sometimes only two feet in the upper reaches, and 3 in the lower, there are good hopes of maintaining 4½ feet; and 6 to Cairo, with an ultimate hope of 8, where now there is 3½ or 4; 10 to Memphis, and 12 below for some distance. At New Orleans the water is deep enough for the largest ocean steamers; and in consequence of the jetties, vessels of 30 feet draft can now ply to foreign ports. See Jetties.

Consult: Annual Reports of the Missouri River Commission, from 1879 on; Ocken, 'The Mississippi River: Some of its Physical Characteristics' (1900); Clemens, 'Life on the Mississippi' (1883).

Forrest Morgan.

Mississippi River Problem. The control of the waters of the Mississippi so as to make the navigation of the river safe and so as to make the immediately surrounding country fit for agriculture is a great economic problem of more than merely local interest. The problem is national historically, for to the control of the Mississippi as much as to any other one thing the historical growth of the country is due. It is even more strikingly true that the problem is of national significance from the commercial point of view, simply because this vast river drains the richest territory in the world, 70 per cent of the area of the United States. The additional importance of the Mississippi as an artery of commerce after the digging of the Isthmian canal is evident, inasmuch as New Orleans will then be a port for Pacific trade. This city commanding a new commerce the regulation of the waters of the Mississippi will benefit very greatly, first, by making the river more thoroughly navigable, and second, by protecting the adjacent country, so that these rich lands can be utilized for the growth of cotton, rice, and cane, and that, at the same time, the railroads now being built between St. Louis and other western points by the 'Frisco road and by the Gould interests will be protected from overflows. In short perfect regulation of the waters of the Mississippi would mean to New Orleans safer communication by land and by water with the country for which the city ships abroad and larger crops to handle from the improved and reclaimed bottoms. The national importance of the control of the river and its safe navigation was outlined in the early 50's by Matthew F. Maury, who picturesquely phrased the almost universal commercial character of the territory it drained to the north and of that which it commanded at the south. Referring to an Isthmian canal, Maury said:—"And when there shall be established a commercial thoroughfare across the Isthmus the trade winds of the Pacific will place China, India and all the islands of that ocean down hill also from this sea of ours. In that case the whole of Europe must pass by our very doors on the great highway to the markets both of the East and West Indies." He also stressed the great future agricultural value of the drowned lands in the Mississippi Valley ceded by the Federal Government to the States; and noted particularly that this access of new fertile soil to the tillable area of the South would particularly affect American supremacy in the cotton market of the world. If this was true in 1850 it is much more true now, for the increased natural wealth of the country lies very largely in the basin drained by the Mississippi; New England, New Jersey, Delaware, South Carolina, Florida, Arizona, Utah, Idaho, California, Nevada, Oregon and Washington are the only States that do not or will not depend for their prosperity on the prosperity of the States actually touching the Mississippi. That this preponderance of importance is not a mere matter of abstract physical geography may be seen from the following table showing the proportion of various interests in the Mississippi area as compared to the whole country:

	Total in United States	Total in the Mississippi area	Percentage of total in the Mississippi area
Population	75,994,575	62,166,099	82
Area, square miles	2,970,230	2,107,550	70
Improved acreage	414,498,487	374,313,897	90
Timber acreage	32,222,037	23,748,801	73
Railroad mileage	194,321	162,506	83
Farm products, value	$4,717,069,973	$4,154,233,789	88
Manufactures, value	$13,010,036,514	$9,850,075,296	75
Wheat, bushels	658,534,252	571,701,154	85
Corn, bushels	2,666,324,370	2,617,409,198	98
Cotton, bales	9,534,707	8,591,391	90
Tobacco, pounds	868,112,865	823,247,901	94
Hay, forage, tons	84,010,815	71,152,786	84
Coal, tons	269,881,827	266,150,899	98
Iron ore, tons	27,553,161	27,177,729	98
Spelter, tons	123,886	115,627	94
Lead, tons	230,090	139,835	60
Petroleum, barrels	63,362,704	59,263,220	93

The showing of this table of present statistics puts the national significance of the Mississippi problem beyond cavil, and it is to be borne in mind that the future, too, should be consulted. As the law that industries sooner or later get as near as possible to the source of raw material is carried out in America, this Mississippi area will inevitably grow faster than any other part of the country. If this entire section had, as it well may have 50 years hence, a mileage as great per square mile of territory as the present State of Ohio, it would possess 458,163 miles, that is more than twice the present mileage of the whole country. A proportional increase in agriculture and manufactures in the Mississippi area would mean annually 700,000,000 bushels of wheat, 8,000,000,000 bushels of corn, a total annual value of $12,500,000,000 in agricultural products, and of $40,000,000,000 in manufactures. The accomplished fact of the last two decades makes such prophecies possible. And the table given above cannot be gainsaid, no matter what the doubter may think of the forecast just outlined. The table certainly shows that what affects the Mississippi area is a matter of national importance, or to be more concrete that the Federal Government should bear the expense of improved navigation on the Mississippi, of protection against flood for the new railroads required by New Orleans' increased shipping in the near future, of protection of farms and plantations along the river course, and of the reclamation of swampy lands adjacent to the river. This is certainly a great and an expensive work, but it would be a break with past tradition and precedent to refuse large appropriations for internal, commercial and industrial defense and offense, or to make the solution of this problem secondary to an increased army or navy list, for example; for the place in world politics taken by the United States is due primarily to agricultural and industrial supremacy. Looking at the question from this side it becomes evident that Mississippi River appropriations are of far too great importance to be merely a part of the Rivers and Harbors Bill; that these appropriations have been placed there is due to the unfortunate fact that the improvement of the navigation of the Mississippi has been treated as the sole item in the great Mississippi problem. As a matter of fact it is primarily and immediately no less important than the protection of riparian lands; and to make it the only end of appropriations, as was done with scarce an exception up to 1891, and very largely since, is to forget the value of the swamp lands with their rich alluvial deposits, which should be reclaimed, and also the new factor in the problem, namely, the demands of the railroads for protection. In comparison with the widespread significance of the Mississippi area, the arid lands of the West which are to be reclaimed by a national scheme of irrigation are small and unimportant. Sooner or later the bigger and more national problem will be settled in a national way. The remedies suggested are various. The levee (see MISSISSIPPI LEVEE SYSTEM) when perfected should protect the railroads and the plantations along the river, besides contributing something to the reclamation of long flooded land. But the levee does not go to the root of the matter. It may not be easier, but the result would be safer, if such terrible floods could be prevented, or partly checked. To accomplish this, or to lessen the volume of water in the lower course of the river, by striking at its upper waters seems theoretically and logically correct, but the practical means are unknown. No doubt the reforesting of the country adjacent to the head-waters of the Mississippi and its tributaries would partly accomplish this, but whether such reforesting itself could be accomplished is a question. Certainly

this is not a speedy, though it may prove the ultimate solution; just as surely such a remedy cannot be applied save by the General Government. The apparent success of the Assouan dam in Egypt as a method of controlling floods and furnishing irrigation supply suggests that a great system of dams and reservoirs might assist in protecting and enriching the soil of the immediate Mississippi Valley. None of these schemes seems to promise any great improvement in the navigability of the Mississippi, which the levees have not greatly bettered, although many of them were constructed by government orders primarily for this purpose and not for protection. Richard H. Edmonds,
Editor 'Manufacturers' Record.'

Mississippi Scheme. See Mississippi Bubble.

Mississippi Sound, an arm of the Gulf of Mexico, extending along the coasts of Mississippi and Alabama from Bay Saint Louis on the east to Mobile Bay on the west and connecting with the latter by Grant's Pass. It is about 100 miles long, from 7 to 15 miles wide, and is formed by a chain of low, narrow, sandy islands, chief of which are Dauphine, Petit Bois, Horn, Ship and Cat.

Mississippian Series, in geology, a group belonging to the sub-carboniferous period and consisting of shales and sandstone beginning in southwestern Illinois, where they are 1,200 to 1,500 feet thick, running south through Indiana, Kentucky and Texas, and divisible into: the Kinderhook group, which includes the Louisiana limestone and the Knobstone sandstones and shales; the Osage group, comprising the various Burlington groups; the Saint Louis group, with thick limestone beds; and the Kaskaskia or Chester group, mostly limestone with shale and sandstone intercalated.

Missolonghi, mĭs-sō-lŏng'gē, or **Mesolongi,** mā-sō-lŏng'gē, Greece, a northwestern town, capital of the nomarchy of Acarnania and Ætolia, on the marshy site on the north side of the Gulf of Patras, 24 miles west of Lepanto. It stands on the edge of a lagoon, across which a causeway two miles long leads to the town. The surrounding level plain, 18 miles long and 4 miles broad, is watered by the Achelous and Evenus, and extends from the base of Mount Aracynthus to the gulf. Missolonghi is the most important strategical point of western Greece and is famous for the sieges it has undergone. In 1804 it came under the rule of Ali Pasha. In the Greek revolt against the Turkish conquerors in 1821, Mavrocordato and Marco Bozzaris, with 400 men, 14 old guns and scanty ammunition, brilliantly defended the place against a Turkish army of 14,000 for two months; when reinforced, they again for over a year resisted the Turks, who raised the siege 6 Jan. 1823. The town was hastily fortified, and from September to December 1823 was again besieged by the Turks, who were defeated by a small Greek force under Marcos Bozzaris (q.v.), but with the loss of their patriotic general. In 1825–6 it stood a long siege by the Turks, latterly commanded by Ibrahim Pasha. A body of its defenders cut their way through the Turkish force and escaped; the remainder determined to sell their lives as dearly as possible, and when the Turks forced their way in, the powder magazine was exploded, thus overwhelming besiegers and besieged in one common catastrophe. Lord Byron, who went to Missolonghi 5 Jan. 1824 to aid the Greeks, died there 19 April 1824; his heart was interred in the church of St. Spyridion, and a monument was erected by the Greeks in his honor. Here also is the tomb of Bozzaris. Pop. (1896) 8,394.

Misson, Francis Maximilian, French traveler and author: b. Lyon about 1650; d. London, England, 23 Jan. 1722. He was a councillor in the parliament of Paris, but at the revocation of the Edict of Nantes, as a Protestant, fled to England. There, in 1685, he became tutor to Charles Butler, earl of Arran, whom he accompanied on his travels. In 1691 he published 'Voyage d'Italie,' in which his comments on the customs of the Roman Catholic Church led to a celebrated controversy with Father Freschot. In 1698 he published a volume of 'Mémoires et Observations,' which constitutes a humorous descriptive dictionary of London life in Queen Anne's reign. His other chief work is 'Théâtre Sacré des Cévennes' (1707).

Missoula, mi-zoo-la, Montana, city, county-seat of Missoula County; situated on both sides of the Hell Gate River, a tributary of the Columbia River, and on the Northern Pacific Railway, in a beautiful and fertile valley, called by the early settlers Hell Gate Ronde. The city has an elevation of 3,201 feet above sea level, and is situated in 46° and 52' north latitude, and in longitude 113° and 50' west. The climate is salubrious, the winters being mild, and the summer and fall delightful. The average annual rainfall is about 16 inches. The city was founded in 1864, the first house, a log cabin, being built that year. The pioneer merchants of Missoula were Worden & Co., who built, in 1865, grist and saw mills, and erected and opened a store. The place at that time was called Missoula Mills, which name it retained for several years, when it was changed to Missoula. It was incorporated 1883. It was the first city in Montana to have commission government. It is situated in the centre of a fine agricultural, fruit and lumbering region, and a large mining region is tributary thereto. Missoula is the seat of the State University of Montana, which was opened in 1895. There are two hospitals in the city, one of them maintained by the Northern Pacific Railway and its employees, in which the employees of the company are treated; the other one is owned and maintained by the Sisters of Charity of the Catholic Church and called Saint Patrick's Hospital, and is one of the largest and best appointed and conducted hospitals in the West. The same Sisters of Charity have a very large academy called the Sacred Heart. A commercial college is also located here, and the city has a splendid system of public schools. The new library building just erected is well supplied with a public library. There are many wholesale and retail stores, and a large mercantile business is done in supplying the local trade, and also in supplying the various mining and lumbering regions tributary to the city. There are two large manufacturing establishments engaged in the manufacture of doors, sash, blinds, dressed lumber, and other building materials; also one brewery, one flouring mill, bottling works, and other manufacturing establishments. The city supports two national and one private bank; it also has 10 churches of different denominations, and a large number of lodges of fraternal organizations, and sustains a Business Men's Club. Fort Missoula, a United States Military Post, 4 miles west of the city, is garrisoned by four companies of infantry troops. The city is the trade centre for a large section of country, and ships large quantities of grain, fruit, hay, livestock, wool and lumber.

The Flathead Indian Reservation, which by an act of the last session of Congress was directed to be surveyed and opened for settlement, lies about 15 miles north of the city, and contains approximately 1,750,000 acres of fine agricultural, grazing and timber lands. This body of land is now being surveyed by the United States government, preparatory to being thrown open to settlement, all of which will be tributary to the city. Missoula is situated in the heart of the country formerly occupied by the Flathead tribe of Indians which was ceded to the United States by a treaty made in 1855, known as the Stevens treaty. Missoula is a Flathead Indian name or word, meaning or signifying «At the stream or water of surprise or ambush.» In the olden days prior to the advent of white men amongst the Indians of this section, the Blackfeet, who were very numerous, and occupied the country on the waters of the upper Missouri, and the Flatheads, who occupied the country in the vicinity of Missoula, were hereditary enemies and engaged in a continuous warfare one against the other. The place where the city of Missoula is now located, being at the western foot of the mountains, and near the mouth of a long and deep cañon, with a beautiful stream of water near by, was a favorite camping place for the Flatheads with their lodges and families. The Blackfeet having a knowledge of this fact, would often take advantage of it, and when on the warpath would secrete themselves in the willows and rocks, and from this ambush attack their unsuspecting enemies, hence the name, «at the stream or water of surprise or ambush.»

Missoula is known throughout the State as the «Garden City,» because of its magnificent gardens and the abundance of flowers grown here. The city is supplied with an abundance of electricity generated at its power plant on the Big Blackfoot River, and transmitted by cable a distance of 7 miles. It also has an abundance of water of the best quality, supplied by a water company from a never-failing stream coming direct from the snow-clad mountains to the northeast of the city. Another water company is engaged in bringing into the city from the Big Blackfoot River, a distance of 10 miles, 800 cubic feet flow of water per second, to be used to supply the future wants of the inhabitants, and to be used for power purposes, and to irrigate the valley lands in the vicinity of the city. Owing to its geographical location, as well as to the topographical conditions surrounding it, Missoula is destined to become one of the most important cities in Montana.

It is situated at the western foot of the mountains at the mouth of the Hell Gate Cañon, through which the Northern Pacific Railway is built, and there is no other pass through the mountains, north or south, for a distance of 250 miles, through which a railroad can be built, and if ever there is another railroad from the east, through Montana, it must of necessity be built down said cañon, and through Missoula, as it is naturally the gateway through the mountains from the east to the Pacific Coast. Pop. (1910) 12,869.

Frank H. Woody,
Missoula, Montana.

Missouri, admitted into the Union as a State 10 Aug. 1821; is bounded north by Iowa, south by Arkansas, east by Illinois, Kentucky and Tennessee, west by Nebraska, Kansas and Indian Territory. Capital, Jefferson City. Area, 69,415 square miles. Pop. (1910) 3,293,335.

Topography.— Missouri is divided into two portions, a northern and a southern, by the Missouri River, which flows in an easterly direction from its junction with the Kansas to a point 12 miles above Saint Louis, where it unites with the Mississippi. The surface of the northern portion is broken and hilly, but not mountainous. Well watered, the land is well adapted to agriculture; but in the eastern parts, and especially along the bluffs of the two great rivers, much timber land is found. The southern portion is about equally divided between timber land in the east and arable land in the west. In the southeast the Ozark Hills form a table-land, rising high above the level of the sea. The southeastern lowlands have an undulating surface, easily drained, with fertile ridges generally running north and south, forests of oak, hickory, elm, maple, ash, locust, willow, persimmon, pecan, chestnut, and cherry trees. In the lowest places are found swamps and morasses. From the mouth of the Meramec River, 25 miles below Saint Louis to Saint Genevieve, rise high, rocky bluffs, sometimes 150 feet above the water, and from Saint Genevieve to the Arkansas border extend low bottom lands with many small lakes and sloughs. The southeast corner of the State is 275 feet above the sea, the northeast 445 feet, and the northwest 1,000 feet.

River Systems.—The Mississippi flows along the eastern shore of the State, its greatest tributary being the Missouri. From the Ozark Hills the Osage, the Gasconade, and other smaller streams flow to the north and east into the Missouri. The Meramec flows through a hilly, wooded country, in a northeasterly direction, and empties into the Mississippi near Saint Louis.

Climate.— Missouri lies far from the ocean and unprotected by mountain ranges. Its climate, therefore, is one of extremes in heat and cold, moisture and drought. The highest range of mountains in the State, in the Ozark region, is lofty enough to influence somewhat the climate of the neighboring country, but not sufficiently so to affect that of the State at large. The mean summer temperature, as shown by observations extending over a period of 20 years, has ranged from 75° in the northwest of the State to 78.5° in the southeast, but the thermometer often indicates a temperature of more than 100°. The winter temperature during this period has averaged 33.87° for the State, varying from 28.5 in the northeast and 39.5 in the southeast. The winter climate is exceedingly variable. Sometimes the temperature falls below zero. In some winters the temperature scarcely reaches zero. In others a temperature of 20°

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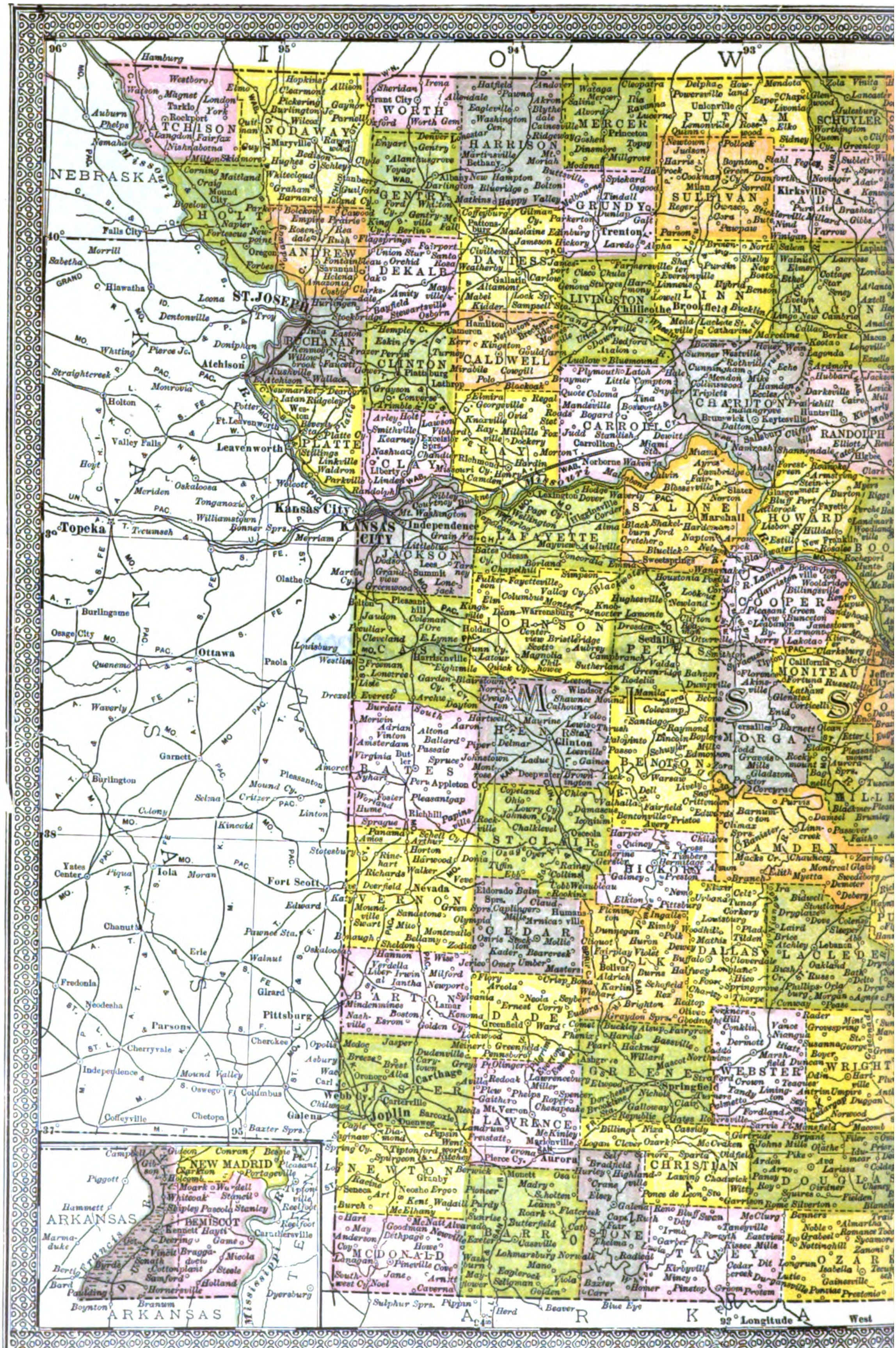
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NEW MADRID
PEMISCOT
DUNKLIN
St. Joseph
Kansas City
Independence
Leavenworth
Atchison
Topeka
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Fort Scott
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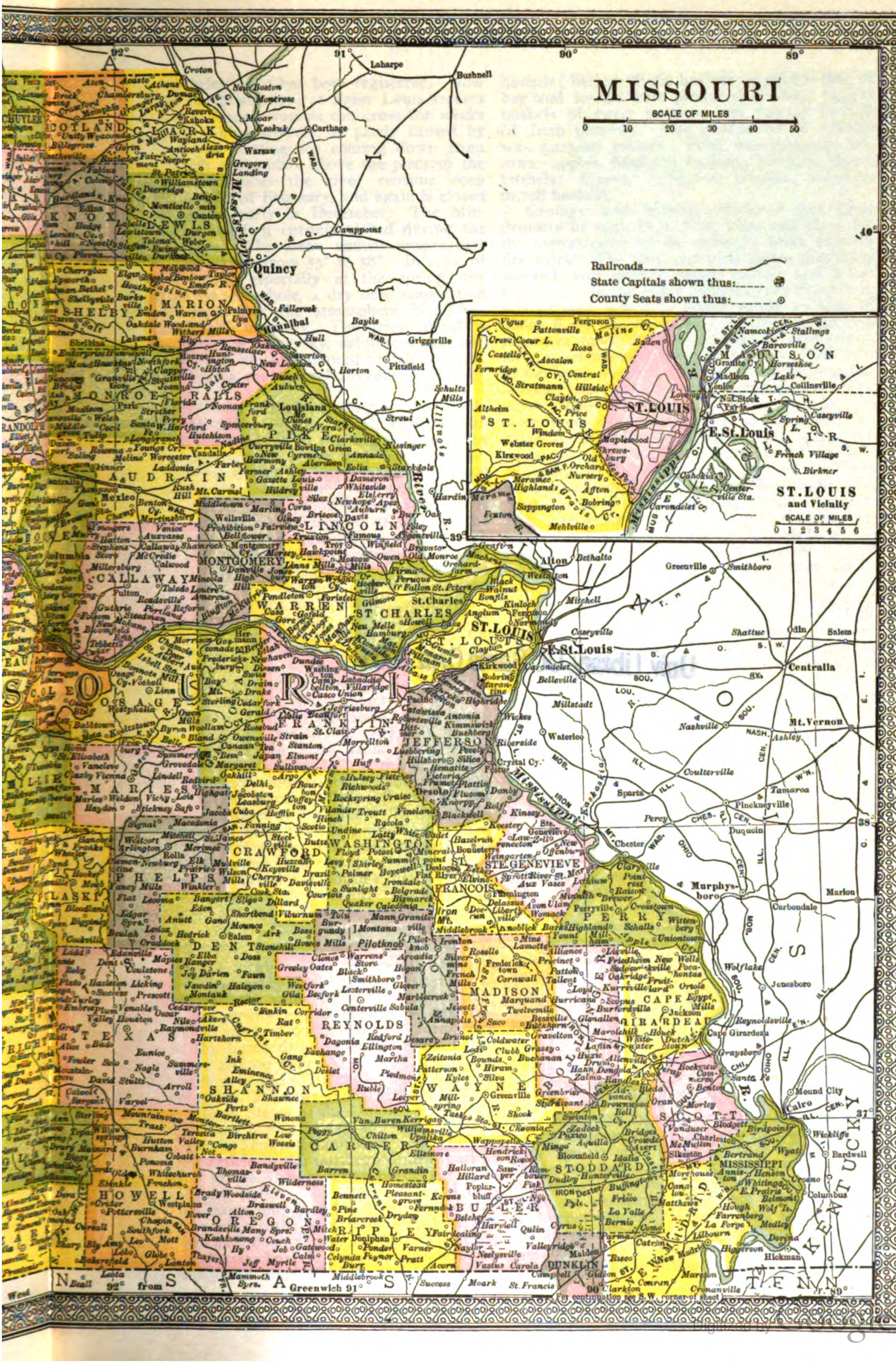
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ST. LOUIS
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GASCONADE
FRANKLIN
JEFFERSON
MARIES
PHELPS
CRAWFORD
WASHINGTON
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ST. FRANCOIS
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SHANNON
WAYNE
BOLLINGER
CAPE GIRARDEAU
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STODDARD
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and more below zero has been registered. Now and then the Mississippi at Saint Louis freezes over so that loaded wagons can cross for weeks at a time. This, however, is partly caused by the masses of floating ice coming down from above, which accumulate above the piers of the bridges. Sometimes the river remains open until the middle of February, and again is closed for the season early in December. The Missouri River is often entirely closed during the winter season. The mean annual temperature of the State varies from 53° to 58°. In spite of abundant rains, especially in the spring, the climate is, on the whole, a dry one, evaporation being so rapid that the atmosphere is seldom overloaded with moisture. The driest month is usually April. A clear sky, salubrious soil and climate, with an unusual amount of fair weather, are chief among the natural advantages of Missouri.

Farming and Stock Raising.— The staple products of Missouri are wheat, oats, Indian corn, and tobacco, but in the southern portions of the State cotton, hemp and flax are also raised to some extent. Thirty bushels of wheat to the acre is an average yield, which is often far exceeded. The flour from Missouri wheat is in great demand in the foreign as well as the home markets, and is regarded as of very high quality. All kinds of grass which favor the raising of stock grow luxuriantly, such as blue grass, timothy, red top, red and white clover. The raising of pork is a large industry, on account of the cheapness of corn. All kinds of fruit are successfully cultivated, not only the more hardy fruits such as the apple, pear, plum, and cherry, but those which require a softer climate, such as apricots, nectarines, figs, and many varieties of grapes. Apples and peaches grow well in all parts of the State. Very many varieties of grapes are found, especially in the southern part of the State, from which large quantities of wine are made. In the production of both red and white wines Missouri may be said to compete successfully with any of the vine-growing States of the Union. In the southern counties of Missouri sheep raising has been carried on with profit, the mild climate, the quality of the grass, and the abundance of good water being especially favorable here to this branch of agricultural industry. There are in Missouri in round numbers 24,528,000 acres of improved, and 10,000,000 acres of unimproved land, including 9,000,000 acres of woodland. The value of farms (1910), including land and improvements (except buildings), is estimated at $1,441,529,000; the value of buildings, $268,976,000; of implements and machinery $50,769,000; and of live stock, $160,540,000. In 1910 there were on the farms throughout the State 1,005,000 horses; 200,000 mules, asses and burros; 3,090,000 milk cows and other cattle; 957,000 sheep; 2,714,000 swine. Missouri ranks fifth among the corn producing States of the Union. In the culture of tobacco it may be put alongside of Kentucky, Virginia, Tennessee, and Maryland. Tobacco is a staple article in the northern central part of the State, in the rich counties bordering upon the Missouri River. No State in the Union raises so many mules and hogs. The annual production of cereals, according to recent statistics, was as follows: corn, 213,840,000 bushels; wheat, 28,562,000 bushels; rye, 225,000 bushels; oats, 18,630,000 bushels; buckwheat, 21,480 bushels; barley, 28,969 bushels; 4,326,896 tons of hay and forage were produced in 1899; 743,377 bushels of sweet potatoes and 629,143 bushels of Irish potatoes. The production of tobacco was 4,225,000 pounds. Fruit was raised as follows: apples, 8,698,170 bushels; peaches, 61,006 bushels; grapes, 13,783,656 pounds; cherries, 62,708 bushels.

Geology and Mining.—Missouri has large deposits of coal, iron, lead, zinc, and clays for the manufacture of the ordinary brick and for fire brick. The Missouri coal mines are easily worked, and include upper, middle and lower measures. In the upper measures are about four feet of coal, which is found within an area of about 8,400 square miles. In the middle coal measures there are about 7 feet of coal within an area of about 2,000 square miles. The coal in the lower measures is found in several seams bearing from 1½ feet to 4½ feet in thickness. About 4,000,000 tons (of 2,000 pounds) of bituminous coal were mined in Missouri, the value at the mine being $5,000,000. Great deposits of iron ore have been found in Iron Mountain in the southeastern part of the State, in Shepard Mountain and at Pilot Knob. The Scotia Iron Banks and Iron Ridge also furnish ores which in appearance and character are generally found in boulders imbedded in soft red hematite. While the chief deposits of iron ores are found in the above mentioned places, smaller deposits are found throughout the hilly regions of the southern part of the State, especially in the counties of Saint Genevieve, Madison, Saint François, Cape Girardeau, Bollinger, Wayne, Stoddard, Washington, Reynolds, Shannon, Carter, and Ripley. The supply of iron ores may be said to be practically inexhaustible. Lead is found in vast deposits in the southern part of the State. The great lead region through which lead ore is very generally disseminated, occupies about one half of the northern portion of Madison County and a somewhat larger territory in Saint François County. The lead is found in the magnesian limestone, and although the percentage of lead in the ore is small, when worked upon a large scale a good profit ensues. The great lead mines of Granby were in the early history of the lead industry in Missouri the best known in the State. Millions of pounds of lead have from time to time been taken from these lands. Of late years the neighborhood of Bonne Terre, in which are located the works of the Saint Joseph Lead Company, has been occupied by several corporations under whose direction vast quantities of lead are obtained every year. It is doubtful whether any other section in the country, or perhaps in the world, produces so much lead each year as is produced in these works. The total production of Missouri lead for the year amounts nominally to about 300,000 tons as compared with 28,000 tons for the year 1900.

Zinc is found in the shape of sulphide, and also silicate of zinc, in nearly all the lead mines of southwestern Missouri. A quarter of a century ago it was found in such masses as to hinder mining operations, and on account of the lack of railroad facilities it was thrown aside as worthless until vast quantities of it had accumulated. Of late years, however, zinc has been an important and profitable adjunct of the lead mines of Missouri. Small quantities of cobalt and some nickel are found in the lead mines of the southeast. Building stone of all kinds, including marble, limestone, sandstone, and both red and gray granite, abound in Missouri, and constitute an important item in the mineral values of the State.

Manufactures.— Outside of the city of Saint Louis the leading manufacturing counties are Jackson, Buchanan, Saint Charles, Marion, Franklin, Greene, Cape Girardeau, Platte, Boone, and Lafayette. Saint Louis produces about three fourths of the manufactured products of the State. Among the chief manufacturing industries of Saint Louis, according to the census of 1900, are the following:

Boots and shoes, valued at	$ 2,765,434
Carriage and wagon material	4,033,799
Railroad cars	4,974,662
Street cars	2,406,836
Clothing	5,577,442
Flouring and grist mill products	4,004,062
Malt liquors	11,673,599
Slaughtering and meat packing	12,267,532
Tobacco in various forms	26,067,670

Kansas City and Saint Joseph are important centres of manufacture, especially of meat products. The valuation of all the industries of Kansas City in 1900 was $36,527,392, including:

Agricultural implements	$ 438,089
Cars and general shop construction	578,020
Clothing (factory product)	1,123,739
Confectionery	1,955,886
Flouring and grist mill products	2,070,111
Foundry and machine shop products	1,042,448
Printing and publishing (book and job)	1,187,253
Tobacco in various forms	224,303

In 1900 the value of products in Saint Joseph was $31,690,736, among which are:

Car and shop construction	$ 639,521
Clothing (factory product)	1,782,395
Flouring and grist mill products	956,576
Slaughtering and meat packing	19,009,332

In Springfield the total value of products was $4,126,871; in Joplin, $2,961,793, of which $592,421 belonged to foundry and machine shop products.

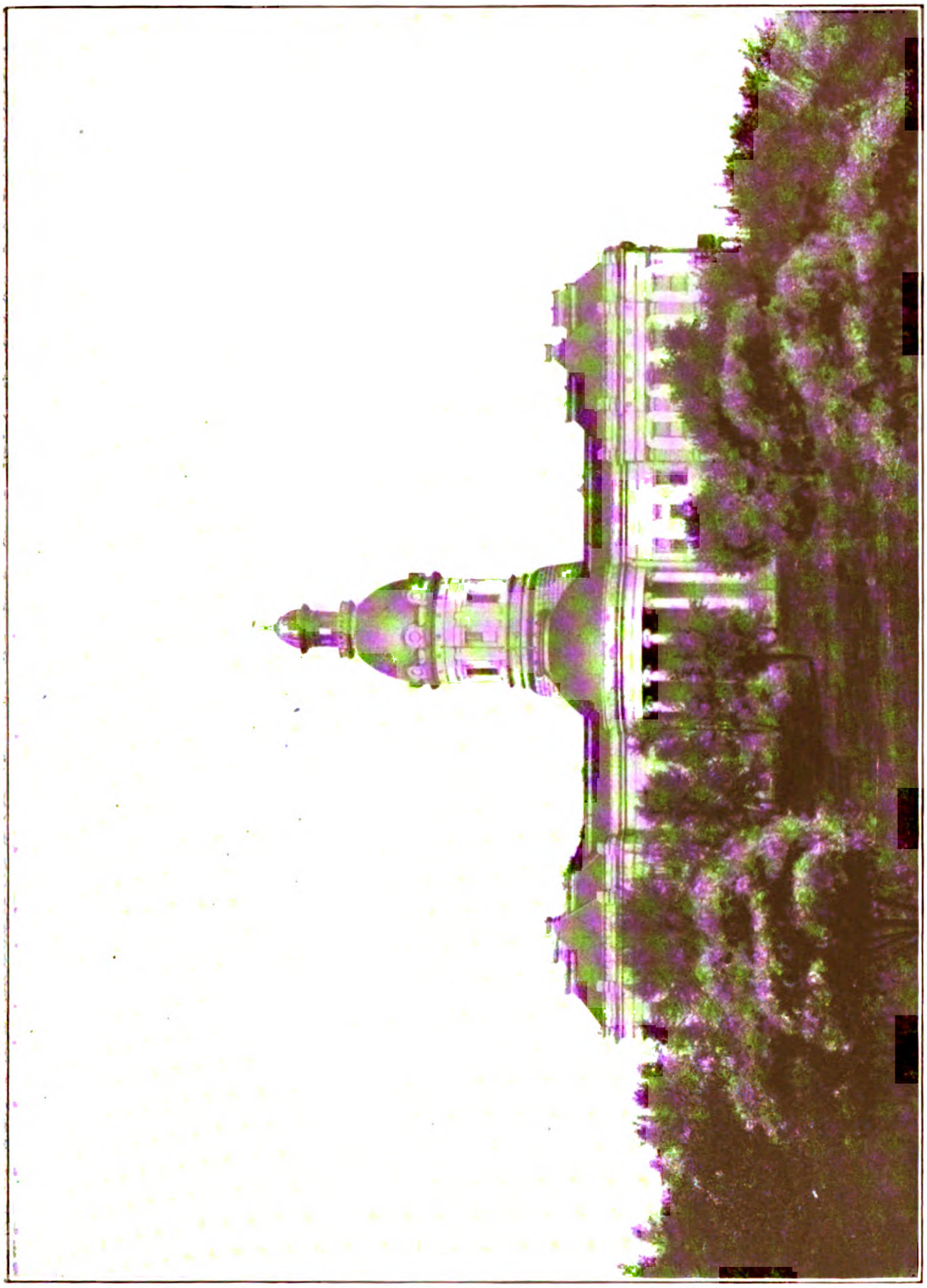
Railroads.— Many important systems of railroads traverse the State, connecting at different points with the great trunk lines leading to all parts of the country. About 30 railroads have their entrance into the great Union Station at Saint Louis. Besides these main lines many cross lines and electric roads have been constructed and are in process of construction throughout the State. The leading trunk lines with eastern branches are the Wabash, the Pennsylvania, the Baltimore & Ohio Southwestern, and several lines running directly to Chicago, namely, the Illinois Central, the Chicago & Alton, Wabash, Rock Island, Chicago, Burlington & Quincy. The lines running to the west, northwest and southwest are the Missouri Pacific, which connects at various points with the great southwestern lines; the Wabash; the Chicago, Burlington & Quincy; the Rock Island; the Iron Mountain, which is included in the Missouri Pacific system; the San Francisco, included in the Rock Island system. These are the leading railroads, which connect at many points with all the great thoroughfares of the United States. River transportation for freight has been revived in late years, and large quantities of cereal products especially are taken to New Orleans from Saint Louis by river and there transferred to the ocean-going steamships. About 2,500,000 bushels of wheat and 300,000 bushels of corn go yearly to foreign markets by river from Saint Louis via New Orleans.

Finances.—In 1910 the assessed valuation of the State was $1,547,126,736. The bonded debt 1 Jan. 1910, was $4,398,839. The State certificates of indebtedness amounted on 1 Jan. 1901, to $3,158,000. The tax rate in 1895 was $5.75 per $1,000; in 1910, $1.70 per $1,000. In 1910 the assessed valuation of all the taxable property in the city of Saint Louis was $564,875,720, which was regarded as 66 per cent of the actual value. The tax rate was $2.22 per $100. The net public debt was $27,815,311. In Kansas City in 1910 the assessed valuation of all taxable property was $155,500,707.25 about 40 per cent of the actual value. The tax rate was $1.25 per $100, and the net public debt $4,472,830.89.

Banks.—In 1910 there were 118 National banks in Missouri, with savings deposits of $9,819,993.97, and over 21,000 depositors. There are 730 incorporated State banks with savings deposits of about $20,000,000. There are also 39 private banks and in the large cities, trust companies, with a large amount of capital. There are in Saint Louis over 30 banks and trust companies, with a total capital and surplus of about $100,000,000. In the year 1872 there were 58 banks with a capital and surplus of $20,196,098, showing that while during the 40 years the number of banks has decreased by 25, indicating a greater consolidation and strength of interest, the amount of capital and surplus has more than quadrupled.

Education.—Missouri has a public school system of education, adopted in 1839. There are district schools, elementary and ungraded; city schools, graded, with high school courses. There are four normal schools maintained by the State, and a State University. The State University is supported by what is called "The permanent Endowment," consisting of certificates of indebtedness amounting to a total of $1,235,839, and in a single year the total appropriations made by the Legislature of the State for the entire University, including all departments, was $586,400. The total amount of funds for the use of public schools is $17,150,000. From the income of this amount there was paid in 1909 for teachers' wages the sum of $7,688,684 in the city, town and village schools. In Saint Louis in 1902 the estimated value of school property was $7,960,445; the total receipts from all sources for the use of the schools was $2,447,016; and the total expenditures $2,189,648, of which $1,163,985 was paid for teachers' wages. Free public schools for white and colored children between the ages of 6 and 20 years are required by law for every district in the State. Besides these institutions supported by the State there are also many private institutions of all grades, for both sexes. Chief among these may be mentioned the Saint Louis University, founded in 1829, under the control of the Jesuit Order of the Roman Catholic Church, with buildings on the college premises representing a total value of about $1,000,000; Washington University in Saint Louis, a nonsectarian institution, which has property estimated at about $7,000,000; William Jewell College, at Liberty, Mo., in charge of the Baptist denomination; Drury College (Congregational) at Springfield, Mo.; Central College (Southern Methodist) at Fayette, Mo.; Westminster College (Presbyterian) at Fulton, Mo.; and others under the control of various religious bodies through the State. The value of buildings and grounds of private educational institutions

MISSOURI.



STATE CAPITOL AT JEFFERSON CITY.

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was, in 1902, $6,740,437, and the amount of permanent endowment was $8,988,232.

Churches.— The first settlers of Missouri were Roman Catholics. In 1819 Christ Church (Protestant Episcopal) was founded in Saint Louis, and soon various religious bodies established themselves in all parts of the State. In the cities and towns along the great rivers the Roman Catholic Church is to-day very strong, and its members are numerous throughout the State. The Methodists (both Northern and Southern wings), the Baptists, the Presbyterians (several branches), and the Episcopalian are the leading Protestant bodies as to numbers, in the order named. Each of these organizations except the Episcopalian has a college supported mainly by its members, and the Roman Catholics have, chiefly in the cities, their parochial schools.

Charitable and Penal Institutions.— The State penitentiary is located at Jefferson City. The number of prisoners is about 2,000. In the last official report the number of white males was given as 1,267; white females, 48; persons of foreign birth, 116; natives, 1,935. The State appropriated in 1900, $80,000 for the support of the penitentiary. The profits from labor exceeded this amount by $50,000. At Booneville is a Reform School for boys with 339 inmates. This school is maintained by the counties from which the boys are sent and costs about $23,000 a year. At Chillicothe is the Girls' Industrial School, upon which is expended annually $14,000. A refuge for the feeble-minded has been established at Marshall, and at Fulton, Saint Joseph, Nevada and Farmington are State asylums for the insane. The State also aids to some extent the insane asylum at Saint Louis, mainly supported by the city. At Higginsville is the Confederate Home, supported at an annual cost of $46,000, and at Saint James the Federal Soldiers' Home, which costs $20,000 a year.

Government.— The present constitution of Missouri was adopted by popular vote in 1875, after a convention called for that purpose had framed it and recommended it for adoption. The Legislature, consisting of a Senate and a House of Representatives, meets biennially on the Wednesday after the first day of January following the election of members. The pay of members is not to exceed $5 a day for 70 days, and if the session is further prolonged, an allowance of only $1 a day is made for the remainder of the session. Mileage is also allowed to members. In the executive department are a Governor, a Lieutenant Governor, a Secretary of State, a State Auditor, State Treasurer, Attorney General, and a Superintendent of Public Instruction. The Governor, in whom is vested the supreme executive power, is chosen for 4 years, as also are other members of the executive department. The Governor has a qualified veto upon the acts of the Legislature. The State judicial authority is vested in a Supreme Court, the Saint Louis Court of Appeals, the Kansas City Court of Appeals, the State Circuit Courts, Criminal Courts, Probate Courts, and Municipal Courts. The judges and officers of the courts are elected by the people. Judges of the Supreme Court are elected for 10 years; of the Saint Louis and Kansas City Courts of Appeals for 12 years; of the Circuit Courts for 6 years. The House of Representatives has the right of impeachment of executive and judicial officers. The Senate tries all cases of impeachment. Every male citizen of the United States and every male person of foreign birth who may have declared his intention to become a citizen of the United States according to law, not less than one year nor more than five years before he offers to vote, who is over the age of 21 years, is entitled to vote at all elections by the people if he has resided in the State one year immediately preceding the election, and has resided in the county, city or town where he shall offer to vote at least 60 days immediately preceding the election.

Politics.—Missouri for more than 30 years was a Democratic State. The vote of the State for presidential electors in 1880 was as follows: Democratic, 208,609; Republican, 155,567; other parties about 80,000. In 1892 the Democratic vote was 268,398; Republican, 226,918; other parties about 85,000. In 1908, however, the Democratic vote was 346,574; the Republican, 347,203; other parties about 19,000.

Population.—Missouri is divided into 115 counties. The following table gives the number of inhabitants since 1850:

YEAR	Males	Females	Total	Density per sq. mile
1850	357,832	324,212	682,044	14.37
1860	622,201	559,811	1,182,012	18.08
1870	896,347	824,948	1,721,295	26.34
1880	1,127,187	1,041,193	2,168,380	31.55
1890	1,385,238	1,293,946	2,679,184	39.
1900	1,595,710	1,510,955	3,106,665	45.2
1910	....	....	3,293,335	47.9

In 1900 the foreign born residents numbered 216,379. There were also 161,234 persons of negro descent. The early settlers of the State were foreign and the population remained French for 50 years after the first settlement. The descendants of those early French families are still to be found in Saint Louis and in many of the older towns. Many Germans have settled in Missouri, especially in Saint Louis, Saint Charles, Saint Joseph, Kansas City, as well as in many of the smaller towns, and a considerable part of the population is made up of English, Irish, Scotch, and Swedes. The native American population until a generation ago was mostly descended from immigrants from the States of Kentucky, Tennessee, North Carolina, and Virginia, but during the last 40 years a large accession to the population has come from the eastern and northwestern States. Saint Louis, the largest city in the State and the most important in the Mississippi Valley, situated upon the Mississippi River, about 12 miles below its junction with the Missouri, had a population in 1910 of 687,029. Kansas City, the next largest town in Missouri, on the western border of the State, had in 1910, 248,381. Saint Joseph, in the northwestern part of the State, 77,403; Hannibal, a river town in the eastern part of the State, 18,341; Sedalia, in the central part of the State, 17,822; Jefferson City, the capital, 11,850.

History.—Missouri is a part of the territory of which La Salle, the French voyager and discoverer, took possession on 9 April 1682, which he named Louisiana in honor of the king of France, Louis XIV. The first settlements in Missouri were made at Saint Genevieve and

New Bourbon, the exact dates of which are unknown. Some say in 1763; others, supported by traditions, as early as 1735. Saint Louis was settled by Pierre Laclède Liguest, a Frenchman. The place for the settlement was selected in 1763 and in February 1764, August Chouteau, at the order of Liguest, began the erection of a village. Settlements of the future State of Missouri were for many years confined to the banks of the rivers. In 1803 all that tract of land called Louisiana was purchased from the French by the United States government, and under an act of Congress passed 31 Oct. 1803, the transfer of Lower Louisiana was made on 18 December 1803. The next year the territory was divided by Congress into two portions; the northern part, commonly called Upper Louisiana, was taken possession of in March 1804. Missouri was organized as a territory in June 1812. The first Governor was William Clark, who served from 1813 to 1820. The application of Missouri for admission to the Union as a State in 1818 was followed by two years of earnest controversy, which excited the whole country and endangered the very existence of the Union. The controversy had as its foundation an attempt to prevent the admission of Missouri to the Union except as an anti-slavery State. This controversy was finally settled by the admission of Missouri upon what was called the «Missouri Compromise» (q.v.), which forbade the existence of slavery in that part of the Louisiana Purchase north of 36° 30′, except in Missouri; and Missouri was admitted to the Union on 21 Aug. 1821. The constitution adopted upon admission remained practically unchanged until 1865. The first Governor under the State constitution was Alexander McNair. Saint Charles was first fixed upon as the seat of government in 1820, but in 1826 the capital was removed to Jefferson City, where it still remains. The first official census of the State, which was taken in 1821, showed that there were in all 70,647 inhabitants, of whom 11,254 were slaves. Missouri troops had their share in the various Indian wars, such as the Black Hawk war in 1832; the Florida war in 1837; and afterward in the Mexican war in 1846. Being a border State and a slave State as well, in all the troubles preceding the outbreak of the War of the Rebellion Missouri was deeply concerned. In many parts of the State the sentiment was strongly in favor of secession. Governor Jackson in January 1861, declared that Missouri must take its stand by the side of slave-holding States whatever they might decide to do. A convention was called to consider the affairs of the nation and in that convention it was made clear that the public sentiment was hostile to secession, and the convention succeeded in preventing any committal of the State to secession. United States troops were gathered at Saint Louis. Attempts made to take possession of the United States arsenal at Saint Louis, with its equipment, by the Secessionists were defeated, and within a few months after the outbreak of the War the greater part of the State was under the control of the United States forces. Governor Jackson declared the State out of the Union, and Confederate forces were assembled in the southwestern part of the State, but the State Convention which had met before now convened again and declared the executive offices vacant and the seats of members of the Legislature also vacant, and the executive offices were then filled by appointment by the convention. At the battle of Wilson's Creek, near Springfield, General Lyon, who had been a strong Union leader, was killed, and General Frémont, who had been placed in charge of the Department of the West, declared martial law throughout the State. At the beginning of the year 1862 the Confederates held nearly half the State, but their strength waned soon afterward and after the beginning of the year 1864 no further trouble arose in Missouri.

The State furnished to the United States during the Civil War 108,773 troops. In 1865 a new constitution was adopted by the people, and in 1869, by a large majority, the 15th amendment to the United States Constitution was adopted. In 1875 a convention was called to draw up a new State constitution. This constitution of 1875 was ratified by the people, and has since then been the fundamental law of the State, modified in some minor particulars by amendments adopted from time to time.

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Missouri, a river in the United States, the largest tributary of the Mississippi. Its head-waters are in southwestern Montana, and the Missouri River proper begins at the confluence of the Jefferson, Madison, and Gallatin rivers. The Madison has its source in Yellowstone Park, near the head-waters of Yellowstone River and the geysers in the western part of the park. The Gallatin also has its rise in the same park and not far from the source of the Yellowstone and Madison rivers. The Jefferson rises farther west, its head-waters are near the source of the Snake River. The Missouri from the confluence of the three rivers flows north and east to the Bear Paw Mountains, when it turns and flows south and east a distance of about 50 miles, when again the course changes toward the east, from the 108th meridian to about 107° 30′ northeast, then east to North Dakota, which State it enters at 48° N. It has a very irregular course in the northwestern part of North Dakota, but it is generally southeast to South Dakota, which State it enters at 100° 20′ W. It crosses the State of South Dakota, marking an irregular course, generally in a southeasterly direction to the boundary of Nebraska at 42° 45′ N. From here it forms the boundary between South Dakota and Nebraska to Iowa at 42° 20′, when it turns south and forms the boundary between Nebraska and Iowa, Nebraska and Missouri, and Kansas and Missouri to Kansas City, where it enters the State of Missouri, flows east by north to Brunswick, then east by south, making two large curves, to the Mississippi which river it enters 20 miles north of Saint Louis. The length of the whole course from the source of the Madison River is about 2,915 miles, from the source of the Jefferson about 3,000 miles. From its source to the mouth of the Mississippi River is a total length of 4,200 miles, the longest continuous water-way in the world. There are some peculiar irregularities along its course, one in Montana, where the Musselshell River enters, is in the form of a «V,» its opening toward the north, the point where the Musselshell enters, and the sides about 12 miles long. Along the course in each State there are long narrow loops, enclosing lands which are almost islands; across the State of Missouri the river forms three crescents, one pointing north and two pointing south.

The Missouri is noted for the great amount of suspended silt it always carries and which has given it the name "Big Muddy." This silt is deposited in reefs which change the current, and frequently much damage results. In 1903 considerable damages were sustained by the washing away or grinding away of portions of Decatur, and Covington in Nebraska, Sioux City in Iowa, and Yankton in South Dakota. The river follows no known rules as to when or where it will deposit its burden of silt, change its current, and begin to destroy a solid shore line. Dikes and stone walls have been constructed in many places. In the upper part of its course the Missouri passes through the "Gate of the Rocky Mountains," a gorge about six miles long and having perpendicular walls about 1,200 feet in height. At Great Falls, Mont., there are a series of falls making a vertical descent of 350 feet in 16 miles. The highest falls is 87 feet.

The chief tributaries are: in Missouri, the Osage and Kansas; in Nebraska, the Platte and Niobrara; a large number of short streams in Iowa; the Big Sioux, White, James, and Cheyenne, in South Dakota; the Little Missouri in North Dakota; and the Yellowstone and Milk in Montana. The extent of country drained by the Missouri and its tributaries is about 500,000 square miles or nearly two fifths of the whole Mississippi basin. The northern point of the basin of the Missouri extends almost to the Saskatchewan River. The Missouri is a swiftly flowing stream in its upper course, and for a distance of about 500 miles it presents scenes of almost unequaled grandeur. It forces its way through narrow gorges, foams over cataracts, and winds around mountains. In the lower part of its course the waters move more slowly on its journeys across the vast plains. It is navigable in summer, during the flood period, to Great Falls, Mont., and in low water as far as Buford at the mouth of the Yellowstone River. The flat-bottomed steamboats are necessarily those used for navigation on the Missouri.

The principal cities on the river from the upper course to its mouth, are Great Falls and Fort Benton in Montana; Bismarck, the capital of North Dakota; Pierre the capital of South Dakota; Sioux City, Ia.; Omaha, Neb.; Atchison, Leavenworth, and Kansas City, Kan.; Kansas City and Jefferson City, Mo. That portion of Iowa lying near the mouth of the Little Sioux and north for about 70 miles, between the Missouri and the Little Sioux, is below the level of the Missouri from 8 to 32 feet. The area of the tract below water level is about 840 square miles, and embraces some of the finest farms and most prosperous towns of the State. It is proposed (1903) to straighten the Little Sioux and to improve the channels and outlets so as to prevent inundations, and also to improve the drainage of this fertile and populous region.

The history of this river is connected with the history of the early explorers and missionaries and with the lives of the miners and settlers of the latter part of the 19th century. The possibilities in the unused water-power of its upper course are enormous. The great prairies through which the river passes on its lower course contain the most productive lands in the United States.

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Missouri, or Gourd-seed, Sucker, a fish. See Blackhorse.

Missouri Compromise, in American politics, a term given to a compromise under an act of Congress passed in February 1821, at which time Missouri was admitted into the Union as a slave State, declaring that all territory west of Missouri and north of lat. 36° 30′ should forever be free from slavery. This compromise was virtually repealed in 1854, when territorial governments were established for Kansas and Nebraska. See Kansas, *History;* Kansas-Nebraska Bill; Missouri.

Missouri, University of, the State university located at Columbia, Boone County. It was chartered by the legislature in 1839, the cornerstone of the main building was laid in July 1840, and instruction in academic work was begun in 1841. The organization comprises eight departments: (1) Graduate Department established 1896; (2) Academic Department; (3) Department of Education (1868); (4) Law (1872); (5) Medicine (1873); (6) Military Science and Tactics (1890); (7) College of Agriculture and Mechanic Arts (1870); (8) School of Mines and Metallurgy (1870), situated at Rolla. The College of Agriculture includes the School of Agriculture, the School of Engineering and the State Experiment Station. The School of Engineering offers courses in civil, electrical, mechanical, sanitary, chemical and hydraulic engineering; the course in the School of Mines includes mining and civil engineering. The degrees conferred are bachelor of arts, bachelor of laws, bachelor of science (in the College of Agriculture and the Mechanic Arts, and the School of Mines and Metallurgy), and doctor of medicine; also the graduate degrees, master of arts, doctor of philosophy, master of science, master of laws, civil engineer, electrical engineer, mechanical engineer, sanitary engineer, engineer of mines, and civil engineer. In 1869 women were admitted to the Normal Department (Department of Education), in 1870 to the Academic Department, and soon afterward to all existing departments; they are now admitted on equal terms to all departments except the Department of Military Science and Tactics. A dormitory for women has been erected on the horticultural grounds which adjoin the regular campus. The University Library includes the general library, 10 departmental libraries and the library of the School of Mines. There being no separate library building, the general library, the classical library, the political science library and the romance library are in Academic Hall; other departmental libraries are in the buildings of their respective departments, the library of the School of Mines being at Rolla; these libraries contained in all about 65,000 volumes in 1910. There are rooms in Academic Hall set apart for gymnasium work for men and women, and there is also an athletic field; competitive athletics and inter-collegiate contests are encouraged, and though regarded as essentially a student enterprise, are under supervision by the faculty. In 1868, the State for the first time gave aid to the University, and has since made several appropriations for special purposes; the endowment is about $2,500,000; and the annual income in 1910 was $710,000. The students numbered 2,362 in 1910 and the faculty, 162.

Missouri Valley, Iowa, city in Harrison County; on the Sioux City & P., the Chicago & N., and the Fremont, E. & M. V. R.R.'s; about 120 miles west of Des Moines, the capital of the State, and 20 miles north of Council Bluffs. The industrial establishments are large railroad shops, machine-shops, flour mills, dairy products, bricks, coffins, grain elevators, and stock yards. The fair grounds of the County Agricultural Society are located here. It has a public library of about 2,000 volumes. The city owns and operates the waterworks. Pop. (1910) 4,000.

Missouri Valley College, in Marshal, Mo., a coeducational institution, founded under the auspices of the Cumberland Presbyterians in 1889. The courses lead to the degrees of A.B. and Ph.B. In 1910 there were 13 instructors and professors, 214 students. There were about 7,200 volumes in the library, and the grounds, buildings, and apparatus were valued at $125,000; the productive funds at $113,000, and the annual income about $19,000. The number of graduates were about 350.

Mist. See Fog.

Mistake, a term commonly used as the equivalent of blunder, error, erratum, and particularly employed in law of a misconception affecting action. In general the law, by an extension of the rule that ignorance is no excuse, makes a mistake without remedy. This is not true, however, in any misapprehension which may be brought under the law of contracts or the principle of quasi-contract. So, too, in equity there is a possibility of relief for mistake and its consequences.

Mistassini, mĭs-tăs-sĕ'nē, Canada, a lake of the Ungava district, about 300 miles north of Quebec, and due east from the southern point of James Bay in Hudson Bay. It consists of two parallel narrow portions separated by a chain of islands, the western and larger portion being about 100 miles long, and 10 or 12 broad. It has a depth of between 300 and 400 feet. It drains by Rupert's River into James Bay. The waters of Mistassini teem with fish, while its shores are densely wooded. The lake was first visited by French missionaries in 1671, but was not surveyed until 1884. The Hudson's Bay Company maintains a trading-post on the lake.

Mistec. See Mixtec.

Mis'tle-thrush, or **Stormcock,** British names for a large European thrush (*Turdus viscivorus*), whose fine song is heard for a longer season than in the case of most birds, and on rainy days as well as sunny. Its common name is due to its unusual fondness for the berries of the mistletoe. In plumage it resembles the American wood-thrush.

Mis'tletoe, a popular name for several related shrubs parasitic upon various deciduous trees such as apple, thorn, maple, poplar, locust, linden, and occasionally oak. The European or common mistletoe (*Viscum album*) of the natural order *Loranthaceæ*, is the one referred to in poetry and prose but a relative, named *Phoradendron flavescens*, is the species most commonly found at Christmas time in the markets of America. The former which is common almost throughout Europe, is an evergreen, bifurcately branched shrub, with opposite, almost sessile, oblong, leathery leaves; inconspicuous flowers in small terminal heads or in the angles of the branches, the pistillate and staminate flowers upon separate plants; and whitish, translucent, glutinous berries about a quarter of an inch in diameter. The stickiness serves to attach the berries to the host plant until germination is complete, the sprout, it is said, always turning toward the point of attachment. The American or false mistletoe is similar in habit and appearance, and has fallen heir to some of the traditions and functions of its European cousin, especially the Christmas practice of kissing under a suspended sprig. Anciently the European species was held to be sacred by the Druids and the Germans, and by the Celts was credited with magical properties, references to all of which are frequent in literature. Its formerly reputed value in medicine has also passed away. Several other species are well known, especially the fragrant flowered *Loranthus odoratus,* and *L. europæus;* the latter being distinguished for its racemes of flowers and its frequent appearance upon oak trees. The common American species mentioned above ranges from New Jersey to Indiana and southward to Florida and Texas. Several related species are found on the Pacific coast.

Mistral, Frédéric, frā-dā-rĕk mēs-trăl (or **Frederi**), French poet: b. Maillane, Bouches-du-Rhone, 8 Sept. 1830. He studied law for a time at Aix, but soon abandoned it, and gave his attention to writing in Provençal, the dialect of southern France, which, under the influence of Jasmin, the "barber-poet," had entered on a renaissance as a literary medium. In 1854 he, with six others, founded the well-known Society of the Felibrige; and in 1859 he published his 'Mirèio,' a narrative poem in the recovered language, which was crowned by the Académie in 1861. A second work in verse, 'Calendau,' came out in 1867; a volume of poems, 'Lis Isclo d'Or' (The Isles of Gold), in 1875; 'Lou Trésor dou Félibrige,' a dictionary of modern Provençal, in 1878–86; and the historical poem 'Nerto,' in 1884. 'La Rèino Jano' (1890) is a tragedy, and 'Le Poème du Rhône' (1879), another narrative poem. There are English renderings of 'Mirèio' by Grant (1867), Crichton (1868), and Preston (1872). In 1904 he was awarded, jointly with Josè Eshegaray (q.v.) the Nobel prize in literature. **Consult:** Downer, 'Frédéric Mistral' (1901).

Mis'tral, the local or provincial name of a strong northwest wind, which, blowing from the Alps, forms one of the scourges of Provence and the valley of the Rhône. It blows with great violence during the winter and spring months. Its approach is indicated by a sudden change in the temperature from warmth to cold; the air becomes purer and more invigorating, light fleecy clouds are seen in the sky, and at night the stars shine with extraordinary brightness.

Mitchel, mĭch'ĕl, **John,** Irish patriot: b. Dungiven, County Derry, 3 Nov. 1815; d. Cork 20 March 1875. He was graduated from Trinity College, Dublin, in 1836, and practised several years as an attorney at Banbridge. Soon after the starting of the 'Nation' in 1842, Mitchell began to contribute to that journal and after the death of Thomas Davis, in 1845, became assistant editor. In 1848 he began the publication of the 'United Irishman,' for his articles in which he was sentenced to 14 years' transportation for felony. He was sent to Bermuda, and next to Tasmania, whence he made his escape to the United States in the summer of 1853. Here he published a series of short-lived newspapers, the 'Citizen' (at New York), the 'Southern Citizen' (Knoxville, Tenn.), the 'Inquirer' (Richmond, Va.), and the 'Irish Citizen' (New York.) His advocacy of slavery did much to lessen American interest in him, and in 1874 he returned to Ireland. He was elected to Parliament from Tipperary, was declared ineligible, but was re-elected. Among his writings are: 'Life of Hugh O'Neille' (1845); 'Jail Journal; or Five Years in British Prisons' (1854); and a 'History of Ireland from the Treaty of Limerick' (1868).

Mitchel, Ormsby McKnight, American astronomer: b. Morgansfield, Ky., 10 July 1810; d. Hilton Head, S. C., 30 Oct. 1862. He was graduated from West Point in 1829, and was made assistant professor of mathematics there, which post he held for two years. From 1832 to 1834 he was counsellor at law in Cincinnati, Ohio; from 1834 to 1844 professor of mathematics, philosophy, and astronomy at Cincinnati College; and 1836–7 chief engineer of the Little Miami railroad. He lectured in various parts of the United States on astronomy in 1842–8, raised funds for the building of an observatory at Cincinnati, the cornerstone of which was laid 9 Nov. 1843, and was its director in 1845–59. In 1859 he became director of the Dudley Observatory at Albany, N. Y. He was known as a popular lecturer on astronomy, and scarcely less distinguished for his mechanical skill. He perfected a variety of apparatus of great use to astronomy. One of the most important of his constructions was an apparatus for recording right ascensions and declinations to within $\frac{1}{1000}$ of a second. He also invented an instrument for the measurement with great accuracy of large differences of declination, such as the ordinary method by micrometer was unable to reach. In 1861 he entered the Federal army as brigadier-general of Ohio volunteers, and on 11 April 1862 was promoted major-general. From 17 Sept. he commanded the department of the South and the Tenth corps, operating in South Carolina. He was known in the army as «Old Stars.» He was a fellow of the American Academy of Arts and Sciences and an associate of the Royal Astronomical Society of London. He published and edited 'The Sidereal Messenger' (1848–58), and wrote: 'The Planetary and Stellar Worlds' (1848); 'The Orbs of Heaven' (1851); 'A Concise Elementary Treatise of the Sun, Planets, Satellites, and Comets' (1860); and 'The Astronomy of the Bible' (1863).

Mitchell, mĭch'ĕl, **Clifford,** American physician: b. Nantucket, Mass., 28 Jan. 1854. He was graduated at Harvard in 1875; studied medicine in Chicago in the Medical College and the Homœopathic Medical College; began to practise in Chicago in 1878; and devoted himself to diseases of the kidneys. In 1902 he established the Chicago Laboratory for Clinical Diagnosis. He is professor of chemistry, toxicology and renal diseases in the Chicago Homœopathic College and author of 'Student's Manual of Urinary Analysis' (1879), 'Physician's Chemistry' (1884), 'Dentist's Manual of Special Chemistry' (1887), 'Renal Therapeutics' (1898), and 'Diseases of the Urinary Organs' (1903), etc.

Mitchell, Donald Grant, American author, («Ik Marvel»): b. Norwich, Conn., 12 April 1822; d. Edgewood, Conn., 15 Dec. 1908. He was graduated at Yale in 1841; studied law in New York; was United States consul to Venice in 1853; and in 1855 settled on his farm, «Edgewood,» near New Haven. He has written much, on various themes, and always with a genial charm and ease of style. His best known works are the idyllic sketches called 'Reveries of a Bachelor' (1850), and 'Dream Life' (1851). He also wrote 'French Gleanings' (1847), descriptive of his first European trip, as 'The Battle Summer' (1850) was of his stay in Paris in 1848; 'The Lorgnette' (1850), a satiric novel of New York life in the forties; 'Fudge Doings' (1855), another New York society novel; 'Dr. Johns' (1866), a religious story contrasting life in Connecticut and in the French Midi; and the more characteristic papers on men, books, and out-doors, such as 'My Farm at Edgewood' (1863), 'Wet Days at Edgewood' (1865), 'Rural Studies' (1867), 'English Lands, Letters, and Kings' (1889), and 'American Lands and Letters' (1897).

Mitchell, Elisha, American scientist: b. Washington, Conn., 19 Aug. 1793; d. on Mount Mitchell, N. C., 27 June 1857. He was graduated at Yale in 1813; four years later became professor of mathematics in the University of North Carolina; and in 1826 was made professor of chemistry, mineralogy and geology in the same institution. The Olmsted-Mitchell Geological Survey (1824–8) did important work under his supervision. He discovered that a peak in North Carolina is the highest in the eastern States and was killed by a fall from this height, which is now called in his honor Mount Mitchell or Mitchell's High Peak, and on whose summit he is buried.

Mitchell, Henry, American civil engineer: b. Nantucket, Mass., 16 Sept. 1830; d. Boston, Mass., 11 Dec. 1902. He was a son of William Mitchell (q.v.), was educated at the Normal School in Bridgewater, Mass., and in 1851 was appointed to government service as a civil engineer under the United States coast survey. He acted as assistant to the commissioners on harbor encroachments in New York in 1859 and discovered the underflow of the Hudson. He was later engaged in Boston harbor and assisted in the improvement of the mouth of the Mississippi in 1874. He made an investigation of the Panama canal scheme under De Lesseps and held many government commissions to investigate various harbors. He was appointed professor of physical hydrology at the Massachusetts Institute of Technology in 1869, and in 1873 was offered the same post in the Agassiz School of Science but resigned. He published many reports of surveys, etc.

Mitchell, Hinckley Gilbert, American Biblical scholar: b. Lee, Oneida County, N. Y., 22 Feb. 1846. He studied at Wesleyan University, where he was graduated in 1873, at the theological department of Boston University, and at the University of Leipsic. He was instructor at Wesleyan 1880–3, and since 1884 has been professor of Hebrew in Boston University.

His most important publications are 'Hebrew Lessons' (1884), 'Amos' (1893), 'The Pentateuch' (1893), 'The Theology of the Old Testament' (a translation from the French of Piepenbring, 1893), and 'Isaiah, Chapters i.–xii.' (1900).

Mitchell, John, American labor leader: b. Braidwood, Will County, Ill., 4 Feb. 1870. He entered the mines at Braidwood at the age of 13, and in 1885 joined the Knights of Labor. The next few years he spent coal mining in different States of the West and Southwest, and in 1890 settled at Spring Valley, continuing his work at his trade. He read and studied constantly, and was a member of several debating societies and reform clubs; he was also active in the labor movement, and was president of the Knights of Labor local at Spring Valley. On the formation of the United Mine Workers in 1890 he became a member of that organization, was frequently delegate to district conventions and in 1895 was elected secretary-treasurer of the northern Illinois sub-district; in 1896 he was chairman of the Illinois mine workers' legislative committee, and in 1897 was made a national organizer of the United Mine Workers. In January 1898 he was elected vice-president of that organization, and in September of the same year became acting president; he was elected president in 1899, but retired in March 1908; he has also been a vice-president of the American Federation of Labor since 1898. During his term of office as president of the United Mine Workers the union was enlarged, wages were increased, and the eight hour day extended; he conducted the strikes of the anthracite miners in 1900 and 1902, and brought the latter to a close by his offer in behalf of the miners to accept the decisions of a commission appointed by the President of the United States. He is also a member of the Industrial Department of the National Civic Federation.

Mitchell, John Ames, American editor and author: b. New York 17 Jan. 1845. He was educated at Harvard and studied in Boston and Paris and was an architect in Boston in 1870–6, after which he became interested in decorative art and studied art in Paris 1876–80. Returning to New York he engaged in journalism as artist, illustrator and writer and in 1883 founded and has since edited 'Life.' He has published: 'Croquis de l'Exposition' (1879); 'The Romance of the Moon' (1886); 'The Last American' (1889); 'Amos Judd' (1895); 'The Pines of Lory' (1901); etc.

Mitchell, John H., American lawyer: b. Washington County Pa., 22 June 1835; d. Portland, Ore., 8 Dec. 1905. He was educated at Witherspoon Institute, Pa., and was admitted to the bar of Pennsylvania and went to California, where he established a law practice, but in 1860 removed to Oregon and engaged in practice there. He was State senator in 1862–6 and president of the senate in 1864. In 1873–9 and 1885–97 he was United States senator from Oregon and was returned to the Senate in 1901. He was professor at Williamette University, Salem, Ore., in 1867–71.

Mitchell, Maggie. See MITCHELL, MARGARET JULIA.

Mitchell, Margaret Julia («MAGGIE MITCHELL»), American actress: b. New York 1832 She made her first appearance on the stage as an infant and before she was five had taken child parts. She made her début as Julia in 'The Soldier's Daughter' at Burton's Chambers Street Theatre in New York, and as Fanchon, the Cricket, produced in 1860, she made herself famous. She was married to Henry Paddock, her manager, 15 Oct. 1868, and continued her career on the stage, playing in many famous roles: 'The Pearl of Savoy'; 'Nan the Good for Nothing'; 'Jane Eyre'; etc., until her retirement.

Mitchell, Maria, American astronomer: b. Nantucket, Mass., 1 Aug. 1818; d. Lynn, Mass., 28 June 1889. She was the daughter of William Mitchell (q.v.), an astronomer of some note, and when a girl frequently assisted him in his observations. She taught for a time in a private school, and was for 20 years librarian of the Nantucket Athenæum, but continued to carry on her astronomical studies and observations. She first became known as an astronomer by her discovery of a comet in 1847, and for this discovery she received a medal from the king of Denmark. She later discovered several nebulæ, and was engaged in computations for the 'Nautical Almanac,' and on work for the Coast Survey for several years. In 1848 she was elected an honorary member of the American Academy of Arts and Sciences, the first woman to receive this honor, and in 1857 went to Europe, visited the principal observatories, and was received with honor by Herschel, Humboldt, and other noted scientists. In 1865 she was appointed professor of astronomy and director of the observatory at Vassar College. She went to Burlington, Iowa, with some of her students, to observe the total eclipse of the sun in 1869, and on other eclipse expeditions; but for the most part she gave up her research and observation work to devote herself to teaching and building up her department. She was an inspiring and original teacher, and deeply interested in the advancement of the interests of the college; during her later years there she endeavored to raise a fund to endow the chair of astronomy; this fund ($50,000) was completed after her death and was named in her honor the Maria Mitchell Endowment Fund. She resigned from her position at Vassar in 1888, and was made professor emeritus. She was a member of the American Association for the Advancement of Science, and was given the degree of LL.D. by Hanover in 1852 and by Columbia in 1887. She was a believer in woman's suffrage, but not active in the suffragist movement; she was, however, a member, and for several years president, of the American Association for the Advancement of Women.

Mitchell, Peter, Canadian politician: b. Newcastle, New Brunswick, 4 Jan. 1824; d. Montreal 25 Oct. 1899. He studied law and was admitted to the bar in 1848. Shipbuilding and other business pursuits soon engrossed his attention and he abandoned law, but in 1856 entered political life as member of the Canadian Parliament and five years later was appointed a life member of the Legislative Council. Mitchell was one of the foremost in the organization of the Canadian confederation, working for it both in and out of parliament. He was senator in 1867–72 and under the new government became minister of marine and fisheries and was chiefly instrumental in settling the negotiations between United States and Canada over the Bering Sea fisheries. He returned to the parliament in 1874 and remained there until 1896, when he was defeated. He owned the Montreal *Herald*, was president of the Mitchell Steamship Company, and was closely connected with the Canadian Pacific Railway. In 1897 he received an appointment as inspector of the fisheries of the Atlantic provinces. He wrote a review of President Grant's message concerning the fisheries in 1870 and ‘Notes of a Holiday Trip’ (1880).

Mitchell, Samuel Augustus, American geographer: b. Bristol, Conn., 30 March 1792; d. Philadelphia 20 Dec. 1868. His early life was devoted to teaching in which he was very successful, but the inadequate treatment of geography by the text-books then in use induced him to turn his attention to the making of satisfactory ones and he spent 40 years in Philadelphia in the preparation of his text-books on that subject. So general was their adoption that they reached a sale of 400,000 annually. Besides his geographical text-books, of which there were 24, he edited a new edition of John James Audubon's ‘Birds of America’ and wrote: ‘General View of the World, Physical, Political, and Statistical’ (1846), and ‘New Traveller's Guide through the United States’ (1850).

Mitchell, Silas Weir, American physician, poet, and novelist: b. Philadelphia 15 Feb. 1829. He studied at the University of Pennsylvania, was graduated from Jefferson Medical College in 1850, entered practice in Philadelphia, during the Civil War was in charge of the Turner's Lane United States hospital (Philadelphia) for diseases and injuries of the nervous system, and subsequently was president of the Philadelphia College of Physicians. In his professional capacity he became known for his researches in connection with nervous diseases, and in physiology and toxicology. A bibliography of his publications would supply the titles of some 150 medical papers, recounting investigations of high scientific importance. To a wider degree, however, he is known through his literary work, composed principally of poetry and fiction. He was elected to the American Academy of Arts and Sciences and the National Academy of Sciences, and was also made associate, corresponding, or honorary member of foreign scientific societies. His works in medical science include: ‘Researches on the Venom of the Rattlesnake’ (1860); ‘Gunshot Wounds and other Injuries of Nerves’; ‘Reflex Paralysis’ (1864); ‘On Injuries of the Nerves and their Consequences’ (1872); and ‘Fat and Blood, and How to Make Them’ (1877). Among his other writings are, in verse, ‘The Hill of Stones’ (1882); ‘A Masque’ (1887); ‘The Psalm of Death’ (1890), and ‘The Wager’ (1900); in fiction, ‘Roland Blake’ (1884); ‘Far in the Forest’ (1888); ‘A Madeira Party’ (1895); ‘Hugh Wynne’ (1897); ‘The Adventures of François’ (1899); ‘The Autobiography of a Quack’ (1900); ‘Circumstance’ (1901). ‘Collected Poems’ (1896); ‘Memoir of Owen Jones’ (1896); ‘Constance Trescot’ (1905).

Mitchell, Walter, American Protestant Episcopal clergyman: b. Nantucket, Mass., 22 Jan. 1826. He was graduated from Harvard in 1846 and admitted to the bar in 1849, but deciding to enter the Episcopal ministry, received ordination to the priesthood in 1860. He held many important charges and was for a time chaplain of Kenyon College, Gambier, Ohio, and has now retired from active service. He has published: ‘Two Strings to His Bow’; ‘Bryan Maurice’; etc.

Mitchell, William, American astronomer: b. Nantucket, Mass., 20 Dec. 1791; d. Poughkeepsie, N. Y., 19 April 1868. He taught for a time, became cashier of the Pacific bank in Nantucket, and made a long series of investigations in connection with the United States coast survey studies of the figure of the earth. Besides lecturing on astronomy in Boston and elsewhere, he contributed to the ‘American Journal of Science,’ and supplied time to whaling vessels. He was elected to the American Academy of Arts and Sciences.

Mitchell, S. Dak., city, county-seat of Davidson County; on two divisions of the Chicago, M. & St. P., and on the Chicago, St. P., M. & O. R.R.'s; southeast of the central part of the State and about 68 miles west by north of Sioux Falls. It was settled in 1879, and incorporated as a city in 1883. It is situated in an agricultural region in which wheat is one of the great crops, and considerable attention is given to raising stock for the eastern markets. The industrial establishments are railroad shops, machine shops, lumber and brick yards, stock-yards, a creamery, and grain elevators. Mitchell ships large quantities of wheat and live stock. The three banks have a combined capital of $125,000. It is the seat of Dakota University, founded in 1885 under the auspices of the Methodist Episcopal Church, and it has good public and parish schools. There are nine church edifices. The government is administered under a general law charter of 1890, and is vested in a mayor who holds office two years, and a council of eight members, four of whom are elected each year. The waterworks are owned and operated by the city. Pop. (1910) 6,515.

C. W. DOWNEY,
Editor ‘Mitchell Daily Republican.’

Mitchill, mich'il, Samuel Latham, American physician: b. North Hempstead, L. I., 20 Aug. 1764; d. New York 7 Sept. 1831. He was graduated M.D. at the university of Edinburgh in 1786, and in 1788 was a commissioner for treating with the Iroquois Indians for the purchase of land. In 1792 he was appointed professor of chemistry, natural history, and philosophy in Columbia College, where he first introduced the system of nomenclature invented by Lavoisier. In 1797 he founded with Dr. Edward Miller and Elihu H. Smith the quarterly ‘Medical Repository,’ of which he continued the editor for 16 years. It was the first scientific periodical published in the United States. In 1801 he became a representative in Congress, and in 1804 was chosen to the United States senate. At the expiration of his term of office he was again elected to the house of representatives. On the establishment of the college of physicians and surgeons he was appointed (1808) professor of natural history, becoming in 1820 professor of botany and materia medica. The institution in 1826 gave place to the Rutgers Medical School, of which Dr. Mitchill became vice-president. Though widely respected in his lifetime as a man of extraordinary learning, he was occasionally the victim of the satirical wits of New York, and the poems of «Croaker & Co.,» to which Fitz-Greene Halleck was a contributor, contain records of some of his eccentricities. He proposed to change the name of this country to «Fredonia,» and wrote in 1804 «An Address to the Fredes, or People of the United States.» He was one of the early supporters of Robert Fulton, whom he accompanied in 1807 in the first steamboat journey on the Hudson. He was the author of 'Observations on the Absorbent Tubes of Animal Bodies' (1787); 'Nomenclature of the New Chemistry' (1794); 'Life, Exploits, and Precepts of Tammany, the famous Indian Chief,' a half historical, half fanciful address before the Tammany Society of New York (1795); etc. Consult Francis, 'Reminiscences of Samuel Latham Mitchill' (1859).

Mite, formerly a term applied to a very small coin worth about one mill. The name was used for a small coin current in Palestine in the time of Christ.

Mit'ford, Bertram, English novelist. He has had a varied career; since 1873 largely South African. Among his published works are: 'Through the Zulu Country'; 'The Gun Runner'; 'The King's Assegai'; 'The White Shield'; 'The Sign of the Spider.'

Mitford, mĭt'fŏrd, **Mary Russell,** English writer: b. Alresford, Hampshire, England, 16 Dec. 1787; d. Swallowfield, near Reading, Berkshire, 10 Jan. 1855. Her education was obtained largely through her very wide reading. Her first published work was 'Miscellaneous Poems' (1810). With the sketches 'Our Village,' descriptive of English rural life (first appeared in 'Lady's Magazine' (1819); collected 1824, 1826, 1828, 1830, 1832). She may be said to have originated a branch of literature. Among her dramatic works, five in number, 'Rienzi' (1828) was most successful; in America it became popular with Charlotte Cushman as Claudia. Included in her further writings are 'Recollections of a Literary Life' (1852), and the works of fiction 'Belford Regis' (1835) and 'Atherton' (1854), the latter highly praised by Ruskin. Her correspondence (published 1870) has been by some ranked almost with her books. Consult the 'Life' by L'Estrange (1870).

Mitford, William, English historian: b. London 10 Feb. 1744; d. Exbury 8 Feb. 1827. He was educated at Oxford, and obtained a commission in the Hampshire militia, of which he became colonel. His early fondness for Greek led him to the study of Greek historians, and he was induced, partly through the advice of Gibbon, a fellow officer in the same regiment, to undertake a 'History of Greece.' The 1st volume appeared in 1784; the 5th and last, bringing the narrative down to the death of Alexander the Great, in 1818. With considerable critical acumen and diligent research he elucidated many obscure points, and until the appearance of the works of Thirlwall and Grote, his history was considered of the highest authority. A strong prejudice against democracy leads him to speak of the Athenians as a horde of treacherous miscreants, of Demosthenes as a malignant demagogue, and of Philip as a perfect statesman and warrior. Mitford was professor of ancient history in the Royal Academy, and member of Parliament for three boroughs in succession 1785–1818. Besides his principal work he published an 'Essay on the Harmony of Language' (1774) and lesser works.

Mithan. See GAYAL.

Mithras, mĭth'răs, **in ancient mythology,** the sun, or the genius of the sun, which was worshipped as a deity by the Persians, and at a later period also in Rome. Mithras stands as a mediator between Ormuzd and the world. He is commonly represented as a handsome youth, wearing the Phrygian cap, tunic, and cloak, and kneeling on a bull, into whose throat he is plunging the sacrificial knife. The bull is at the same time attacked by a dog, a serpent, and a scorpion. In Germany many tokens of its former existence are still to be found, as the monuments at Hedernheim, near Frankfort-on-the-Main, and other places.

Mithridates (mĭth-rĭ-dā'tēz) **VI.,** surnamed EUPATOR, and also styled commonly THE GREAT, king of Pontus: b. Sinope 134 B.C.; d. Pantacapæum 63 B.C. He ruled from 121 B.C. until his death. He early entered on his career of conquest, which ultimately involved him in war with Rome. He subjugated the peoples on the northern shore of the Euxine (Black) Sea, attacked Cappadocia and Bithynia, and since these were allies of Rome, there encountered Roman opposition. After the death of Sulla, 78 B.C., Mithridates levied another army to expel the Romans from Asia. Being defeated by Lucullus, appointed consul 74 B.C., he was followed by the victorious Romans into his own states, and driven to seek a refuge in Armenia, then ruled by Tigranes, who refused to deliver him up. Here Mithridates raised a third great army, and in 67 B.C. completely defeated the Romans; and, following up his success, rapidly recovered the larger part of his dominions. The Romans now invested Pompey with absolute power in the East, and by him, in 66 B.C., the forces of Mithridates were completely routed near the Euphrates. The king retired to Bosporus (the Crimea), where his troops, headed by his son Pharnaces, broke out in mutiny, and Mithridates killed himself. He was considered by Rome its most formidable enemy. He was a patron of art and science, and is said to have spoken 22 languages. See POMPEY; SULLA.

Mitla, mēt'lā, Mexico, a village of the state of Oaxaca, on the Mixtecapan plateau, 26 miles southeast of Oaxaca. It is celebrated for its extensive ancient ruins which comprise five great groups of temples, palaces, tombs and other edifices covering about 2,000 feet square and respectively known as (1) The Catholic establishment; (2) the Columns; (3) the Arrows; (4) the Adobe; and (5) the South Side. They were elaborately decorated with admirable mosaic work in geometrical designs, and with pictographic mural paintings. The ruins of a fort of the same architecture dominate a hill a short distance west of the city, and in the vicinity are the quarries whence the stone for building the city was obtained. See MEXICAN ARCHÆOLOGY. Consult: Saville, 'Cruciform Structures near Mitla' (1900).

Mito, mē'tō, Japan, a town in the island of Hondo, 7 miles from the east coast and 65 miles by rail northeast of Tokyo. It is a town of considerable antiquity and has played an important part in the history of the country. There is an old castle, now used for an educational institution, and some fine public gardens. The manufactures include cloth, paper, cigarettes, etc. Pop. about 35,000.

Mito, or Mytho, French Indo-China. See Mytho.

Mito'sis, or Karyokinesis, the process of indirect nuclear division of cells undergoing growth or beginning those changes in the egg which bring about the growth of an embryo. This is almost universal, but "amitosis," or direct cell-division occurs in pathological tissues and a few of the lowest organisms. The first stages are characterized by a rearrangement of the nuclear network into a series of loops or V-shaped bodies. Meanwhile a minute body in the cytoplasm, or extra-nuclear cell-contents, has divided into two, and the portions have arranged themselves at opposite poles, with the nucleus between them. Each of the two portions forms a star-like aggregation consisting of a centrosome with a radiating mass. The V-shaped bodies, or chromosomes, of the nucleus arrange themselves with their open ends outward and their closed ends near the centre, and they then separate along the central or equatorial plane, one-half proceeding to each centrosome, with whose rays it becomes incorporated and is firmly held. The cell then becomes constricted between the centrosomes, and in each of the two portions a new nucleus is developed by a process essentially the reverse of that just described. The final result is the formation of two daughter-cells out of the original mother-cell, each of which contains an exact half of the essential chromatin elements not only in respect to equal quantities, but in respect to those qualities, chemical or other, which constitute the inheritable individuality of the organism. For fuller information see Cell; Embryology; and consult the authorities cited under those titles.

Mitrailleuse, Fr. mē-trä-lĭ-ėz. See Ordnance.

Mitral Valve. See Heart, The.

Mitre, Bartolomé, bär-tō-lō-mā' mē'trä, Argentine soldier, politician, and author: b. Buenos Ayres 26 June 1821; d. there 19 Jan. 1906. He was the leader in the movement in which Buenos Ayres proclaimed itself independent 11 Sept. 1852, and was successively minister of the interior and of war in the Buenos Ayres government. The force commanded by him was defeated by Urquiza at Capeda 23 Oct. 1859, and Buenos Ayres was reunited with the Argentine Confederation. In May 1860 he was elected governor of Buenos Ayres. New troubles with the Confederation arose, and he defeated Urquiza at Pavon 11 Sept. 1861. In 1862 he was elected president of the New Argentine Republic to serve for 6 years, and after a very prosperous administration became minister to Brazil. His chief works are: 'Historia de Belgrano' (1857); and 'Historia de San Martin' (1884), of which there is an abridged English translation (1893).

Mitre, in ecclesiastics, a sacerdotal ornament worn on the head by bishops and other church dignitaries on solemn occasions, being a sort of cap pointed and cleft at top. There has been much controversy regarding the date at which the mitre became part of the official dress of bishops. Some have contended that the early Christian church adopted with little change the head-dress of the Jewish priests. Three kinds are worn in the Roman Catholic Church, namely, the precious mitre, of gold or silver and ornamented with jewels; the *mitra auriphrygiata* of gold cloth, without jewels (except pearls); and *mitra simplex* or plain mitre, of white silk or linen. Bishops and mitred abbots receive their mitres from the bishop who consecrates them. The Greek Church has no mitre. Since the Reformation the mitre has rarely formed a part of the costume of an English Church dignitary, but some bishops have worn it in quite recent times.

Mitre-shell, the shell of a gastropod mollusk of the genus *Mitra* and family *Mitridæ,* closely allied to the *Muricidæ,* so called because of its resemblance in form to a bishop's mitre. The shells are thick, somewhat fusiform, with the spire very high and acute, and a small aperture and operculum. The genus is a very large one, comprising several hundred species mostly from shallow, tropical seas, and especially abundant in the Malayan region. *Mitra episcopalis* is abundant on the tidal flats of the Philippine Islands. During the day, especially at low water, they burrow beneath stones or hide in crevices, but are active at night. They secrete a purple fluid having a nauseating odor, and act as scavengers. Consult Cooke, 'Cambridge Natural History,' Vol. I. (1895).

Mitsui, mēt-soo'ē, a name which has in Oriental financial circles a prestige similar to that of Rothschild in those of the West. The mercantile house of Mitsui and Co. was established by Takatoshi (1633–1706), and has been identified with almost every large concern of industrial and economic interest in Japan.

Mitylene, mĭt-ĭ-lē'nē, **Mytilene,** or **Lesbos,** a historic island of the Ægean Archipelago, off the northwest coast of Asia Minor, since 1462 belonging to Turkey, and called by them Midillii, while the Greeks generally call it *Mitilini* or *Mytilene,* from its capital. In shape it is nearly triangular, but on the south there are two deep and nearly land-locked bays; it has an area of 675 square miles, and a population (1901) of about 125,000. It is mountainous, but fertile, and is one of the finest islands of the Archipelago. The cultivated fruits include the olive, vine, fig, orange, pomegranate, apricot, pear, and apple. The olive is the most important crop, large quantities of oil being produced. Wine, for which the island was anciently famous, is still made, but after antiquated methods. The chief exports are oil, hides, wool, valonia, and fruits. There is excellent marble, deposits of iron, copper, alum, etc., and thermal springs utilized in the cure of rheumatism and nervous diseases. There are some tanneries, soap-works, numerous oil-mills, earthenware works, etc. The island anciently known as Lesbos was famous as a centre of Greek life and civilization. It formerly contained six cities, by far the most important being Mitylene and Methymna. It was early inhabited by Greeks of the Æolian race. Its inhabitants made an active resistance to the Persians, but were finally obliged to submit (about 540 B.C.). After the defeat of the Persians by the Greeks at the battle of Mycale (479 B.C.) it became the ally of Athens. During the Peloponnesian war it revolted from Athens, whereupon an Athenian fleet was sent against it, the walls of Mitylene were demolished, and a thousand of the richest inhabitants put to death. The island itself was divided into 3,000 parts, of which 300 were devoted to the service of the gods, and the rest divided among the Athenians, by whom they were rented to the ancient proprietors. The cities, nevertheless, soon rebelled again. Alexander the Great made a treaty with the Lesbians after the battle of Granicus, and the island was afterward reduced by the Macedonians, and subsequently became part of the Roman province of Asia. It was placed by Constantine in the Provincia Insularum. In 1462 A.D., after belonging to a Genoese family, the island was taken by Mohammed II. During the War of Independence, the Turkish and Greek squadrons fought a battle off Mitylene 7 Oct. 1824, on which occasion the Turks were defeated and their fleet was destroyed. In consequence of strained relations between France and Turkey, a French fleet was sent to Mitylene 5 Nov. 1901; and remained there till the Porte agreed in full to the demands made. The Lesbians in ancient times were notorious for their dissolute manners, and the whole island was regarded as the abode of pleasure and licentiousness. At the same time they had the reputation of the highest refinement, and of the most distinguished intellectual cultivation. Poetry and music made great progress there. The Lesbian school of music was celebrated, and is said to have produced musicians superior to all the other musicians of Greece. Among these the most distinguished were Arion of Methymna, and Terpander of Antissa. Alcæus and Sappho, both Lesbians, were esteemed the first in lyric poetry. Pittacus (one of the seven wise men), the philosophers Theophrastus and Theophanes (the bosom friend of the great Pompey), and the historians Hellanicus, Myrtilus, etc., were also natives of this island. It was often chosen as a place of residence by distinguished foreigners. Epicurus and Aristotle taught there.

Mivart, mĭv'art, **Saint George Jackson**, English naturalist: b. London 30 Nov. 1827; d. there 1 April 1900. He was educated at Harrow and King's College, London. Having joined the Roman Catholic Church in his 17th year, he therefore received his academic training in St. Mary's College, Oscott. In 1851 he was called to the bar at Lincoln's Inn, but the possession of ample means enabled him to gratify his taste for natural history. He was appointed lecturer on zoology in St. Mary's Hospital Medical School in 1862, and from 1874 till 1884 was professor of biology in the Roman Catholic University College at Kensington. On the invitation of the Belgian bishops he accepted, in 1890, the chair of the philosophy of natural history in the university of Louvain. Elected a fellow of the Royal Society in 1867, he was vice-president of the Zoological Society in 1869 and 1882, secretary of the Linnæan Society 1874–80 and its vice-president on two occasions (1880 and 1892). Dr. Mivart contributed a large number of papers to the leading reviews and to the proceedings of the learned societies with which he was associated, among the chief being those on 'The Structure of the Fins of Fishes,' 'The Osteology of Birds,' 'The Zoology, Anatomy, and Classification of Apes and Lemurs,' and his 'Memoir of the Insectivora.' He also published several important works on natural history subjects and the philosophical questions arising out of them. His best-known work is 'The Genesis of Species' (1871), in which, while fully admitting organic (though not mental) evolution, he argues against Darwin's theory of natural selection and attempts to explain the production of new species as due to an innate plastic power. Among his other works may be enumerated: 'Elementary Lessons in Anatomy' (1872); 'Man and Apes' (1873); 'The Common Frog' (1874, new ed. 1881); 'Lessons from Nature' (1876); 'Contemporary Evolution' (1876); 'The Cat' (1881), a good introduction to the study of the vertebrate animals, especially the mammals; 'Nature and Thought' (1883); 'A Philosophical Catechism' (1884); 'On Truth: A Systematic Inquiry' (1889), in which he discusses the ultimate basis of science; 'The Origin of Human Reason' (1889), in which he insists on the fundamental distinction between man and all other animals; 'Monograph of the Canidæ' (1890); 'Birds: The Elements of Ornithology' (1892), a useful introduction; 'Essays and Criticisms' (1892); 'Types of Animal Life' (1893), all vertebrate and mainly mammalian; an 'Introduction to the Elements of Science' (1894). The articles in the 9th edition of the 'Encyclopædia Britannica' on Apes, Reptilia (Anatomy), and Skeleton were from Mivart's pen. He published anonymously a novel, 'Henry Standon,' republished shortly after his death under the title 'Castle and Manor.' Mivart's contributions to the study of the vertebrate animals, though not of epoch-making importance, were always valuable and luminous. In the latter part of 1899 and the beginning of 1900 he expressed himself with considerable freedom regarding certain doctrines of the Roman Catholic Church, and on his refusal to sign a declaration of faith submitted to him was inhibited by Cardinal Vaughan from taking the sacraments of the Church.

Mixed Marriages, a name applied to marriages between persons of different religions. In the United States the term generally refers to a marriage between a Roman Catholic and a Protestant. In England a marriage between a baptized and an unbaptized person is ecclesiastically invalid; one between a member of the Catholic Church and of any other Christian communion is valid, but illicit, unless a dispensation is first obtained. If a Roman Catholic and a Protestant desire to marry, they must, according to Roman Catholic practice, promise that the children shall be brought up in the Roman communion; the bishop may then grant a dispensation and the marriage, without the nuptial benediction, must be performed by a Roman Catholic priest without any repetition of the ceremony by a Protestant clergyman.

Mixed Property. That which is not altogether real or personal, but a compound of both, such, for example, as heirlooms, tombstones, etc.

Mixosau'rus, a genus of small fish-lizards (*Ichthyopterygia*) from the Triassic formations of Europe, differing from typical ichthyosaurs by their fewer teeth and some minor characters.

Mixtec, mēs-tāk', or **Mistec**, a Mexican tribe of Indians of the Zapotecan stock occupying the coast of Guerrero. They are highly skilled in agriculture and the simpler arts, have built cities and temples of hewn stone, and possess a hieroglyphic literature, keeping a calendar like the Aztec tribes. They are noted for their pottery and woven products.

Mizpah, mĭz'pa, or **Mizpeh,** the name of several places in Palestine. The word signifies a high place, or lookout. Mizpeh of Gilead (Gen. xxxi. 29) is still pointed out with its group of rough stone monuments in the village of Sûf. — The Mizpeh of Benjamin (Josh. xviii. 26, etc.) lay north of Jerusalem on an unknown site.— That of Judah (Josh. xv. 38) stood in the low hills northeast of Lachish. Nothing is positively known of the Mizpeh of Moab (1 Sam. xxii. 3).

Mjösen, myė'sĕn, **Lake,** Norway, situated in a picturesque and fertile valley, 36 miles northeast of Christiania, is the largest lake in the country. It is 62 miles long, with a maximum breadth of 10 and an average breadth of two miles. It is exceptionally deep, having a maximum depth of 1,460 feet. It is fed by the Laugen River and drains into the Glommen through the Vormen. There are numerous popular summer resorts on its shores.

Mnemonics, a system of artificial aids for assisting the memory. Such methods have been in use for many years. They consist in the main of some mechanical scheme or framework which, by association, is linked with what one desires to memorize. One of the oldest forms of verbal mnemonics is contained in the familiar lines, "Thirty days hath September, April, June and November," etc.; and many similar devices are known. The medical student has an unlimited number of mnemonic aids whereby to remember the names of the muscles, to call to mind the relations of important viscera, and to determine accurately the order of the cranial nerves. Students of logic have for years made use of mnemotechnic devices to remember the parts of the syllogism. (See LOGIC.) Some of these devices are based on topical association, whereas others depend on number and letter relations, and a great many which have been in vogue in recent years are based upon sound and rhyme relations. A general criticism that can be made of most of these memory-schemes is that the processes are purely mechanical, and that one of the fundamental features in memory, that is, memorizing for the sake of idea-relation, is given up for the sake of word-relation. For certain classes of students and for certain lines of work these mechanical schemes may be of much service; for salesmen, for instance, who need to bear in mind immense quantities of goods with their wholesale, retail, and discount prices. But as a process of general culture, improving mind-facilities, so called, mnemotechnics are mechanical. See MEMORY.

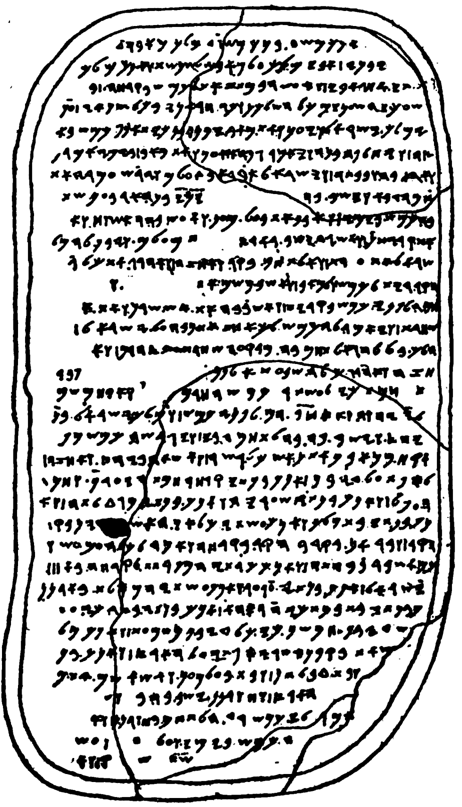
Mnemosyne, nē-mŏs'ĭ-nē, in Greek mythology, the mother of the nine muses of Zeus. She was a daughter of Uranus.

Mo'a, one of a race of extinct ratite flightless birds of New Zealand, forming the family *Dinornithidæ* and composed of several genera (see DINORNITHES) ranked between the apteryx and the epiornis. They had comparatively small heads, small eyes, bills of varied form, great legs, wings almost or quite wanting and the head and neck bare. The feathers of the body were rounded, loose in part downy, with great aftershafts. Some of the feathers were black with red-brown bases and white, others blackish brown or yellowish. They varied in size from that of a turkey (*Anomalopteryx parva*) to that of the huge *Dinornis maximus*, 12 feet in height. The remains of these birds are found in sand-dunes, bogs, caves and places where the aborigines had fed upon their flesh. Not only bones, but pieces of skin, ligaments, feathers and eggs have been recovered. It is probable, indeed, that these birds became extinct only four or five centuries ago. The Maori traditions recount the wars of extermination which their early ancestors waged with the moa; and the natives profess to show the spot where the last one was killed. Clearer traditions say that the habits of the birds were sluggish, but their disposition fierce. They lived in pairs, fed upon green shoots and fern-roots and made rude nests on the ground. Their anatomy was elaborately described in a memoir by Owen, 'Extinct Birds of New Zealand' (London, 1879), and a general account of them may be found in Newton's 'Dictionary of Birds' (1896).

Moab, mō'ăb, the ancestor of a Semitic people who occupied a region east of the Dead Sea and the Jordan from an early period till the Christian era. In the Old Testament (Gen. xix. 37) he is said to be the son of Lot by his elder daughter. The "plains of Moab" spoken of in Numbers are the hot plains of the Jordan Valley. The region to which the Moabites were confined by the Amorites was strongly fortified on every side by nature, and was noted for its rich pastures and its wine. The institution of monarchy was of much earlier introduction among the Moabites than among the Israelites, but the religion of Moab seems to have been very similar to that of their more celebrated neighbors and kinsfolk. Their supreme god was Chemosh, who held among them much the same position as Jehovah among the Israelites, and they seem to have had something akin to the priesthood and general theocratic organization of the Israelites. The Moabites were harassed by the Assyrians, but at one period they assisted the latter against the Jews. Moab is mentioned about the 6th century A.D., but the people, as distinct from their neighbors, have long passed out of existence. The extensive ruins which now cover their country bear witness to their former greatness. The language of Moab was closely akin to that of Israel.

Mo'abite Stone, in archæology, a monument of black basalt, about 3 feet 8½ inches high, and 2 feet 3½ inches wide, and 1 foot 1¾ inches thick, with rounded top but square base, on which there is an inscription of 34 lines in Hebrew-Phœnician characters, discovered in 1868 by F. A. Klein at Dhiban in the ancient Moab, just north of the river Arnon. An attempt made to purchase it led to a quarrel among the Arabs of the district, and the stone was destroyed partially by being heated and then by throwing water upon it, which caused it to break into three large and several small pieces. The larger pieces were secured for the Louvre by M. Clermont Ganneau, an official connected with the French embassy at Constantinople, who was also fortunate in obtaining a paper impression of the inscription before the stone was broken. The inscription dates about 900 B.C., and is the oldest known in the Hebrew-Phœnician form of writing. It was erected by

Mesha, king of Moab, and is a record of his wars with Omri, king of Israel, and his successors. The narrative also treats of Mesha's wars against the Edomites. Consult Ginsburg, 'The Moabite Stone' (1870).



The Moabite Stone.

Moallakat, mō-āl-lä-kät'. See Arabia, *Literature*.

Moa'ria, in geology, a name applied by Mantell to a hypothetical southern continent, the home of the moa. The supposition is that New Zealand, Chatham, Philip and the Auckland islands, and other Polynesian islands are the remains of this submerged continent. The assumption of the existence of such a continent, as is the case with Lemuria (q.v.), is for the purpose of explaining the distribution of the species.

Moawiah, mō-ā-wē'yā. See Caliph.

Mobangi, mō-bāng'gē. See Ubangi.

Moberly, mō'bĕr-lĭ, Mo., city, in Randolph County; on the Wabash and the Missouri, K. & T. R.R.'s; about 125 miles northwest of St. Louis. It is an agricultural region, and in the vicinity are valuable deposits of fire-clay, and also extensive coal fields. Some of its industrial establishments are the machine-shops of the Wabash Railroad, flour and lumber mills, ice factory, grain elevator, foundry and machine-shops, brick and lumber yards. The trade is chiefly in live-stock, poultry, wool, tobacco, dairy products, hides, and the local manufactures. It is the seat of St. Mary's Academy, and has public and parish schools and a public library. It has also a Young Men's Christian Association building. Pop. (1890) 8,215; (1900) 8,012; (1910) 10,923.

Mobile, mō-bēl', Ala., city, seaport, county-seat of Mobile County; on the Mobile River at its entrance into Mobile Bay, 33 miles from the Gulf of Mexico; 141 miles by rail from New Orleans, 180 from Montgomery, 104 from Pensacola. It is on the Southern, Louisville & Nashville, Mobile & Ohio, Mobile & Bay Shore, and Mobile, Jackson & Kansas City R.R.'s. Commercially and historically, Mobile is one of the most important and interesting cities of the South. It is one of the leading cotton markets and shipping points of the country, the natural centre of the Alabama-Tombigbee cotton region. A semi-weekly line of large freight steamers plies up the Alabama to Montgomery, 410 miles, and to Demopolis, at junction of Tombigbee and Warrior rivers, and smaller vessels ascend the Warrior to Tuscaloosa, and at high water to Columbus on the main stream, navigable the year round. The exports include cotton, cottonseed-oil, fruits, coal, lumber, live stock, meat, tar, turpentine, and rosin, etc.,—a total of over $12,000,000 a year. The exports for the year ending 1 Sept. 1903, were $12,600,000, and the imports $4,170,000, largely tropical fruits, coffee and sisal. There are manufactures of great diversity with a product in 1909 of about $5,429,000, and employing 2,719 persons. Headed by lumber and timber products from the Alabama forests, they comprised also grist milling, foundry and machine work, ship and boat building, shingles, boxes, barrels, baskets, cigars, confectionery, saddlery and harness, brooms and brushes, brick, baking and yeast powders, malt and distilled liquors, ice, etc.

Topography.—The city is built on a level sandy plain about 15 feet above the bay, rising gradually to low hills, and furnishing good drainage; the streets are mostly rectangular, broad and finely shaded. The "shell road," skirting the bay, and Government Street, are noted drives; and there are three parks, Washington, Bienville, and Monroe. Near by on the south and west are dry, sandy pine hills, agreeable retreats during the hot season; and across the bay in Baldwin County, called the eastern shore, are many summer resorts. The water supply is so pure that it is used for chemical purposes without filtering; it comes from two sources,—Spring Hill 5 miles distant, Clear Creek 11 miles. The sanitary condition of the city has vastly improved and the yellow fever, once a frequent visitor, has entirely disappeared. The death rate in 1900 was 25.9.

Public Buildings.—The chief structures are the government building, which cost $250,000, the court-house, Cotton Exchange and Chamber of Commerce, the Masonic Temple, Odd Fellows' and Temperance Halls, the Battle House, Bienville Hotel, Athelstan Club and one of the best arranged markets in the south, the United States Marine Hospital, the city hospital, the Providence Infirmary, and the cathedral of the Immaculate Conception, and several handsome churches of different denominations. The United States court for the Southern District of Alabama has its seat here. The educational institutions include a splendid free school system which occupies the Barton Academy and other buildings in various parts of the city, the Col-

BIENVILLE SQUARE, MOBILE.

Univ. Library, UC Santa Cruz 2001

lege of Saint Joseph, Spring Hill College a few miles west (Roman Catholic, 1830), McGill Institute, Evangelical Lutheran Institute, Convent and Academy of the Visitation, Medical College of Alabama (1859), Saint Mary's School, and three public libraries,—the Public, Mobile (subscription), and the Y. M. C. A.

There are three daily and several other newspapers. The mayor, a council, and a board of aldermen at large, are elected for three years; they form a General Council which elects the other officers. The assessed valuation in 1900 (basis of ½) was about $16,000,000; net debt $822,000. Tax rate $26.50 per $1,000.

Trade and Commerce.—The fiscal year ending 30 June 1903, marked the banner year in Mobile's foreign trade, exceeding that of the previous record year, which ended June 1902, by over $500,000, the total trade, imports and exports, for the 12 months of 1902–03 reaching the total of $16,790,000.

The trade with Cuba, West Indies, and Central America continues large. The exports to those countries for fiscal year ending 30 June 1903 being nearly $4,000,000, and the imports over $5,000,000. It is noticeable in the export trade of Mobile that the increase in value of cotton anl lumber exported in 1902–3 is $1,534,000 over 1901–2.

The export and import trade of Mobile in 1893–4 was $3,475,803; in 1902–3 was $16,790,000, an increase of nearly 500 per cent in 10 years.

In 1888 Mobile had but 17 feet of water in the channel from the lower bay to the city. In that year the government began the project of deepening the channel to 23 feet; this was completed to 22 feet in 1901, and to 23 feet in 1903.

There is now 24 feet of water on the outer bar at the entrance to Mobile Bay, which will be deepened to 30 feet by July 1904. There is from 30 to 40 feet of water in the lower bay, which is a safe, land-locked harbor. There is no record of any vessel having been lost by storm in Mobile Bay or harbor.

Mobile is the third largest importer of tropical fruit in the United States. Its vegetable and truck farming interest is also very large. Its fish and oyster business is of much importance and increasing all the time.

Mobile's timber trade is very large, the mills in the territory having a capacity of 1,200,000,000 feet yearly, which is exported through this port to every port of the world.

History.—Mobile Bay was the original seat of French colonization in the Louisiana territory. Iberville founded a temporary settlement at Biloxi in 1699 and in 1702 he removed it to the Mobile River 27 miles above the bay, where occurred the famous «petticoat insurrection» of the women against too much corn-meal diet. A monument was erected there on the bicentennial of Mobile's foundation. In 1711 a hurricane and flood nearly destroyed the place, and the settlement was removed to the present site. It remained the capital till 1722, when New Orleans was given that position. In 1763 Mobile passed into British hands, and they changed the name of its Fort Condé to Fort Charlotte; in 1780 the Spanish general Galvez captured it, and it was confirmed to Spain by the treaty of 1783. On 13 April 1813 it was captured by the American Gen. Wilkinson: Fort Bowyer at the mouth of the bay was retaken by the British, but again given up. It was incorporated as a town 20 Jan. 1814, as a city 17 Dec. 1819. In 1818 the Bank of Mobile was founded, which in the panic of 1837 was one of the only four United States banks which did not suspend; the same year (1818) steamboats were operated on the rivers. In 1839 it was nearly destroyed by fire and ravaged by yellow fever, again in 1852 by flood and fever. On 4 Jan. 1861 the State authorities took possession of Forts Morgan and Gaines in the harbor, though the State did not secede till the 11th. Mobile is the only American city which has been under five sovereignties. In August 1864 Farragut entered the harbor past the fire of the forts, amid mines and torpedoes, and after a heroic battle destroyed or captured the Confederate fleet including the ram Tennessee, and in co-operation with Gen. Gordon Granger captured the forts. The city was not taken until 1865, just before the surrender. The government afterward carried on great improvement works in the harbor, deepening its 13 feet of channel to 21 feet. Owing to Reconstruction finance, the city became bankrupt, and on 11 Feb. 1879 its charter was canceled and the name changed to Port of Mobile; on 10 Dec. 1886 a new charter was given and the old name restored.

Population.—(1785) 746; (1813) about 500; (1820) 1,500; (1830) 3,194; (1840) 12,672; (1850) 20,515; (1860) 29,258; (1870) 32,034; (1880) 29,132; (1890) 31,076; (1900) 38,469, of whom 17,067 were colored; (1910) 51,521; including the suburbs, about 63,000.

L. F. Irwin,
Secretary Mobile Chamber of Commerce.

Mobile, a bay on the southeast coast of Alabama, which is really the estuary of the Tombigbee and the Alabama rivers. That part of the estuary to which the name of Mobile Bay is applied is about 30 miles long and from 9 to 12 miles wide. At the entrance to the bay are long narrow strips of land, almost obstructing the entrance. On the east, at Mobile Point, is a revolving light; on the west, on Dauphin Island, are Forts Morgan and Gaines. Between Dauphin and the mainland is Grant's Pass, a strait connecting Mobile Bay with Mississippi Sound. The United States government has improved the harbor, and from a shallow entrance, which was a hindrance to navigation, there is now a channel through which vessels drawing 23 feet and over can enter, and vessels drawing 17 to 23 feet can ascend to the wharves of the city.

Mobile, a river in Alabama, the name given to the western stream or mouth of the river formed by the junction of the Alabama and Tombigbee rivers. The eastern stream or mouth is called the Tensas. From the junction of the rivers to the head of Mobile Bay is, in direct line, about 25 miles, but the winding of the stream makes its course about 50 miles long. The Mobile and Tensas communicate at several points, but the two streams enter the Mobile Bay at the city of Mobile, by the same delta.

Mobile Bay, Battle of, a battle of the Civil War fought 5 Aug. 1864. Mobile Bay is divided from the Gulf of Mexico by Mobile Point east and Dauphin Island west, about three miles apart; but the ship-channel of less than 2,000 yards, narrowing to 750 outside, closely skirts Mobile Point. The latter was defended by Fort Morgan; the island by Fort Gaines, too far from the channel to be very formidable. Between them stretched a line of piles and torpedoes, but leaving a narrow channel for blockade-runners, marked off by a red buoy. Within was the Confederacy's most powerful ram, the Tennessee, and three small unarmored paddle-wheel gunboats. Farragut's Federal fleet (in order of battle) comprised the monitors Tecumseh, Manhattan, Winnebago, and Chickasaw, forming an inshore column; and the wooden sloops of war Brooklyn, Hartford (flagship), Richmond, Lackawanna, Monongahela, Ossipee, and Oneida, forming an outer one, each with a smaller mate lashed to the port side, to insure passage through if the starboard vessel's machinery should be disabled. Farragut would have led in the Hartford, but the Brooklyn had machinery for picking up torpedoes. The advance began at 5:30 A.M., and firing at 7:05; the instructions were to keep east of the red buoy, but the Tecumseh went west and was sunk by a torpedo. The Brooklyn stopped in fear of a like disaster, and the Hartford with Farragut passed her and led the fleet into the bay. Each vessel received much damage from Fort Morgan, but they silenced its guns by destructive fire, and all succeeded in anchoring three miles up. One Confederate gunboat was then sunk, one captured, and one took refuge next the fort; the Tennessee was to be attacked after dark, but itself assailed the flagship, and after a desperate fight was disabled and surrendered. The Lackawanna collided with the Hartford and nearly sunk her. The Union fleet lost 52 killed, 170 wounded, and 113 drowned in the Tecumseh; the Confederates 10 killed, 16 wounded, and 280 prisoners, besides the casualties in the fort. Both forts surrendered a few days later. The Union fleet carried 159 guns, and the officers and crews numbered 3,000 men. The Confederate fleet carried 22 guns and 470 officers and men.

Joseph T. Derry,
Author of 'History of Georgia.'

Mobil'ian Trade Language, an Indian jargon, used in the Gulf States and Northwest. It is based upon Choctaw, with additions from numerous other dialects. The early French colonists called it *Mobilienne,* from the city of Mobile, which was formerly a great trading centre of the Gulf region. The language was spoken in Louisiana as late as 1850.

Mobilier, Crédit. See Crédit Mobilier.

Moc'casin, Moccason, Mocassin, or **Moccassin,** originally a deerskin sandal, the sole and upper of which are formed of one piece of leather. It was formerly the ordinary foot-covering worn by the North American Indians. In recent times fancy moccasins are made for the general shoe trade, all kinds of leather being utilized for the purpose.

Moccasin-flower, a name for the American orchids (q.v.) of the genus *Cypripedium,* especially the large pink *C. acaulé,* given to them by the Indians in allusion to the shape of the inferior part of the flower. Lady's-slipper is a common English name of the same import. See Orchids.

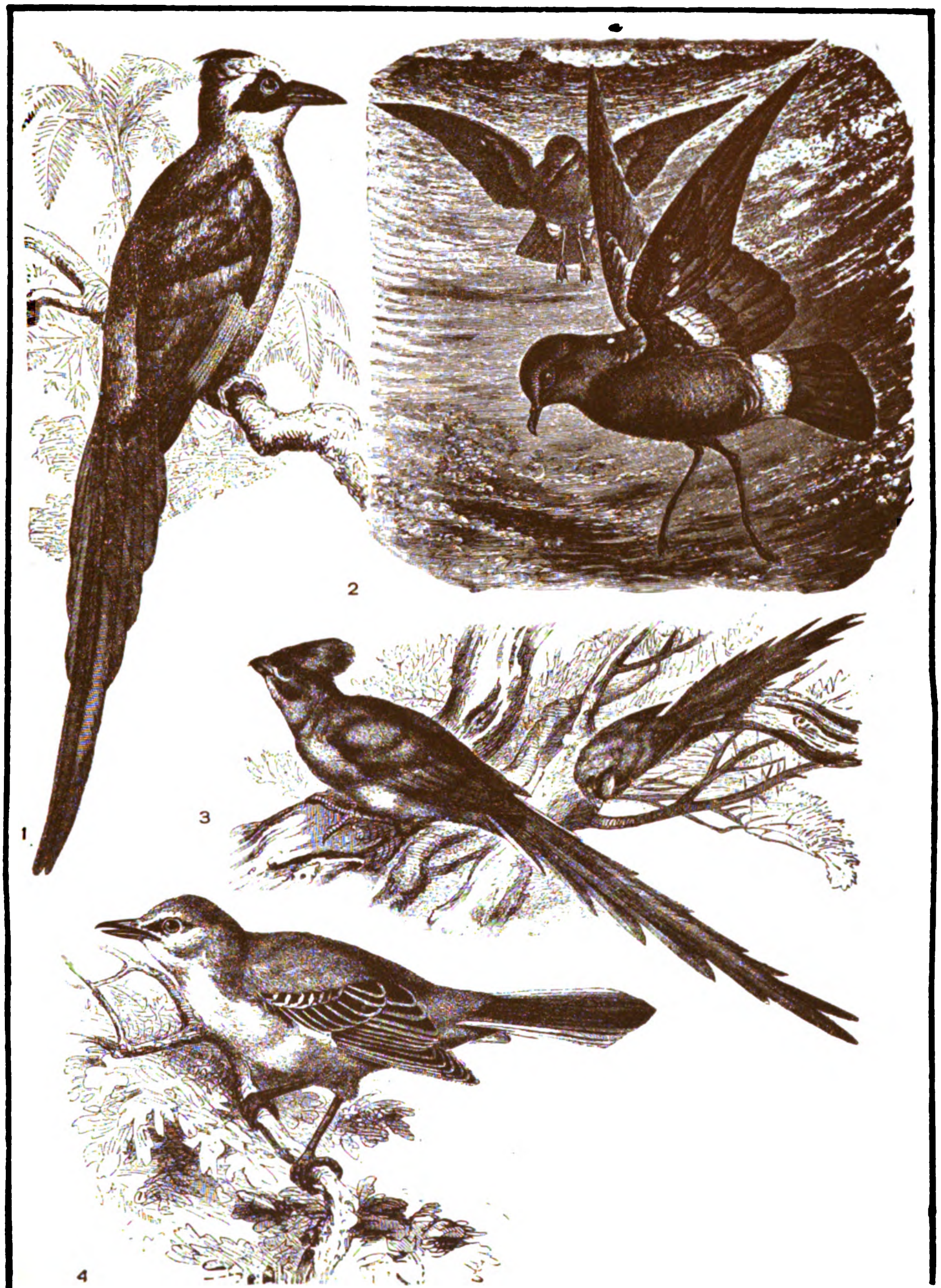
Moccasin Snake, or **Cotton-mouth,** a large venomous serpent (*Ancistrodon piscivorus*) of the rattlesnake family, but having no rattles, the tail ending only in a horny spike, like that of its near relative, the copperhead (q.v.), sometimes called "upland moccasin." It inhabits river-banks, swamps, and fresh-water marshes throughout the southern half of the United States, swarming in some regions, like the Everglades of Florida, or the half-flooded woods of lower Louisiana, and constantly invading the rice-fields. Elsewhere it is not greatly to be feared, as it rarely leaves the edge of the water, where it is fond of lying upon some low overhanging bush or floating log, ready to drop upon the fishes and frogs, which form its principal food, and which it pursues with great speed in and under the water. It often reaches a length of four feet, and its bite is deadly, the widely opened mouth in the act of striking showing cottony white. Its color is a dark reddish brown, obscurely marked with blackish, and with white blotches on the lips and abdomen. Eight or ten young are produced annually, viviparously; and these are frequently captured, but never yield any of their native sullen ferocity. One of the most complete biographies of this snake is that by Stejneger in the 'Annual Report' of the Smithsonian Institution for 1893.

Mocha, mō'kạ (Arabian, mō'hä), or **Mokha,** Arabia, a fortified seaport, the former capital of Yemen, on the Red Sea, 130 miles northwest of Aden. During the 16th and 17th centuries Mocha was the chief port and emporium from which the coffee of Yemen was exported, whence the proverbial term, "Mocha coffee." The trade has been diverted to Hodeida and Aden. Pop. about 4,800.

Mock Orange, a name applied in England to the Syringa (q.v.), and in the United States to the *Prunus caroliniana,* a small evergreen resembling the cherry-laurel.

Mocker-nut, a species of hickory (q.v.).

Mocking-bird, a familiar and celebrated songster of the southern part of the United States (*Mimus polyglottus*), representing a genus of thrush-like wrens, many other species of which are known in Mexico, Central America, and West Indies. The plumage of all is bluish-gray and white, with no striking ornaments but much elegance of outline and tint. Their habits differ little from those of thrushes and other migratory, insect-eating birds, but they show great courage in defending their nest, placed usually in a bush or small tree, against cats, snakes, and similar enemies. The young, when taken from the nest for domestication, should be removed at an early period; or if taken later, they are generally removed by means of trap-door cages. The ordinary song notes of the mocking-birds are clear, bold and varied. They sing during the night, like the nightingales, and appear to begin their song with the rising moon. The imitative notes of these birds are, however, still more varied than their natural tones. They mimic with success the songs of their feathered neighbors, and with such exactitude as to deceive the ear of the most experienced sportsman. When they are kept in confinement all the sounds of the household, as well as the mewing of cats, the barking of dogs, the cry of an injured chicken, and the screech of the hawk, are all exactly imitated. They are hardy and require only ordinary care and attention to live contentedly for many years in any moderate climate. The mountain mocking-bird (*Oroscoptes montanus*) of the Rocky Mountain re-



1. Motmot.
2. Mother Carey's Chicken.
3. Mouse-bird.
4. American Mockingbird.

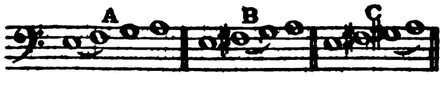
Univ. Library. UC Santa Cruz 2001

gion; and the various "thrashers" (q.v.) are relatives not greatly inferior in song; while the mocking-wren (see **Wren**) is a more distant relative highly gifted in imitative powers.

Mock'ler-Fer'ryman, Augustus, English military expert and author: b. Ireland 1856. He was educated at Cheltenham College and Sandhurst; entered the army in 1876; was instructor in fortification (1892–7) and in military topography (1897–1900) at Sandhurst, where he became professor of the latter subject in 1900. He has published 'Up the Niger, Narrative of Maj. Claude Macdonald's Mission' (1892); 'In the Northman's Land' (1896); 'British West Africa' (1898); 'Annals of Sandhurst' (1900); 'British Nigeria' (1902); technical articles, etc.

Mod'der, or Kaiba, River, South Africa, a tributary of the Vaal River, joining the latter about 30 miles above its confluence with the Orange River. It has an eastward course of over 180 miles. It came into considerable prominence during the Boer war of 1899–1902; along its banks at Maagersfontein the British were driven back with great loss in 1899, and at Paardeberg, the Boer general Cronje surrendered in 1900.

Mode, in music, (1) the manner of arranging the tones and half-tones in a scale, this general designation being always accompanied by a qualifying adjective, as Dorian mode, minor mode. Greek music, from which our modern music has been evolved, had an elaborate system of nine modes, which were afterward extended to fifteen. Authorities vary considerably as to the differences between the modes; it is certain, however, that they were the outgrowth of an earlier Greek music, the basis of which was the tetrachord. A tetrachord is a short scale of four notes, one of the intervals being a half-tone and the others whole tones, for example:

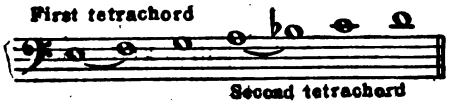


(A) Dorian tetrachord, half-tone, ½; (B) Phrygian tetrachord, half-tone, ⅔; (C) Lydian tetrachord, half-tone, ¾.
The slur indicates the half-tone.

The tetrachords were probably named after the people that originated them.

Until the time of Terpander (7th century B.C.) all Greek music seems to have been confined to the limits of a tetrachord. The lyre, which was then used merely to give the singer the pitch, had but four strings, each capable of sounding but one note. It was tuned in one of the ways shown above, though the notes written should be understood to be merely relative, each singer tuning his lyre to suit his own voice.

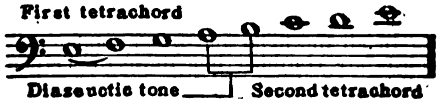
Terpander increased the compass of the lyre by adding a second tetrachord to the first, using the highest note of the first for the lowest of the second, thus making an incomplete scale of seven notes.



Terpander's Seven Note System.

The middle note, A, belonging to both tetrachords, was called *Mese* (middle) and had somewhat the function of our modern keynote. It will be noted that the two tetrachords are both Dorian, which was the characteristic and favorite Greek tetrachord rather than the foreign Phrygian or Lydian.

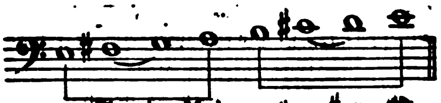
Pythagoras (582 B.C.) is the reputed author of the octave system (the foundation of our modern system). He probably learned it during his visit to Egypt, where it is said to have been in use for many centuries before. By this system the two tetrachords, instead of having a note in common, were separated by a whole tone, called the diazeuctic tone or tone of disjunction.



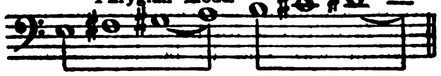
Pythagoras' Octave System.

A was still the keynote or Mese, though no longer the middle or connecting note. Terpander's was called the conjunct system and Pythagoras' the disjunct system. The latter as above printed constituted the Dorian mode, which may be defined as two Dorian tetrachords separated by the diazeuctic tone, embracing the compass of an octave. Terpander's system not having this compass, cannot strictly be called a mode. Music seems to have developed on both these systems simultaneously in Greece, though finally that of Pythagoras supplanted Terpander's and became universal.

By replacing the two Dorian tetrachords with two Phrygian or two Lydian the modes of the same name were formed.



Phrygian Mode.



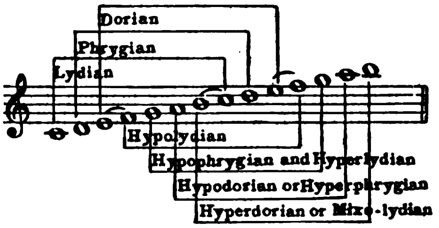
Lydian Mode.

These three were the principal modes. Each had two auxiliary modes, one commencing a fourth below and distinguished by the prefix *hypo*, the other commencing a fourth above with the prefix *hyper*. The complete list of the nine original modes is as follows:

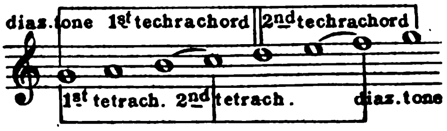
I. Dorian.
II. Phrygian.
III. Lydian.
IV. Hypodorian or Æolian.
V. Hypophrygian, Ionian or Iastian.
VI. Hypolydian.
VII. Hyperdorian or Mixolydian.
VIII. Hyperphrygian or Locrian.
IX. Hyperlydian.

A convenient way to remember them is to imagine a series of scales, all of natural notes, and an octave in compass, beginning on each of the seven natural notes. It should be remembered that the pitch is entirely relative; each of these modes might begin on the same actual sound. The Mese or Keynote is the fourth note of each scale.

On examination it will be seen that the three Dorian modes are each formed of two Dorian tetrachords, the three Phrygian modes of two Phrygian tetrachords, and the three Lydian modes of two Lydian tetrachords. In the three principal modes the diazeuctic tone separates the tetrachords. In the hypo-modes it is the lowest note and in the hyper modes it is the highest note. In all the hypo and hyper modes the tetrachords are conjunct like those of Terpander. It will be seen that two of the hypos correspond exactly with two hypers, namely, the hypophrygian and the hypodorian are the same as the hyperlydian and the hyperphrygian. It will be observed, however, that the arrangement of the tetrachords and the diazeuctic tone are not the same.

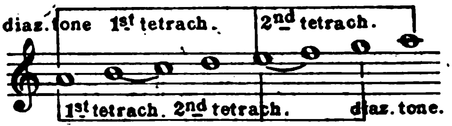

Dorian
Phrygian
Lydian
Hypolydian
Hypophrygian and Hyperlydian
Hypodorian or Hyperphrygian
Hyperdorian or Mixo-lydian

Hypophrygian Mode.



Hyperlydian Mode.

Hypodorian Mode.



Hyperphrygian Mode.

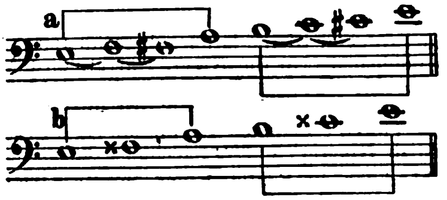
Each mode was said to have its characteristic quality or sentiment; the Dorian seems to have been the favorite one for heroic utterance, while the Lydian was said to be languishing and erotic.

The modes were afterward increased to fifteen, at least three of which were mere transpositions by octaves of earlier modes. In fact some theorists hold that the later development of the Greek modes completely changed their original significance and that instead of their being different arrangements of whole and half tones in a scale they were all identical in formation and were in fact merely Dorian modes of different pitch. If this is so they should not be called modes at all, but keys, as in modern music. The titles of the modes seem to contradict this theory, but the subject is so confused and the different theories so difficult of proof that wide differences of opinion will probably always exist. The complete list of the fifteen modes is as follows, the pitch given being said to be the accepted one for each mode (or key):

Fourths below	Originals	Fourths above
Hypodorian (A)	Dorian (D)	Hyperdorian or Mixolydian (G)
Hypoionian (B*b*)	Ionian or Iastion (E*b*)	Hyperionan (A*b*)
Hypophrygian (B)	Phrygian (E)	Hyperphrygian or Locrian (A)
Hypoæolian (C)	Æolian (F)	Hyperæolian (B*b*)
Hypolydian (C♯)	Lydian (F♯)	Hyperlydian (B)

The Greeks had in addition three kinds of chromatic modes and an enharmonic mode. They were all modifications of one or both of the interior tones of the tetrachord, the outer tones of which were never allowed to change their relative pitch. These modes had no significance in the history of music and were not adopted by the Romans.

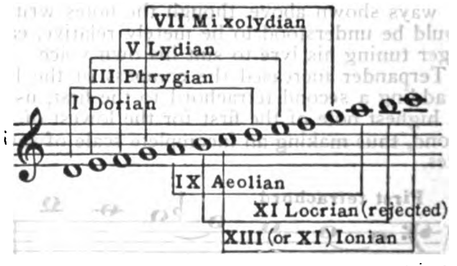
The following are examples of Pythagoras' original Dorian mode changed to (a) chromatic and (b) enharmonic:



The X is used to represent a sound one quarter of a tone higher than the one preceding it.

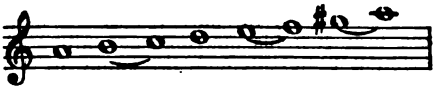
The Gregorian or ecclesiastical modes are based on the Greek modes, though many errors and changes of names were made in arranging the system. St. Ambrose, bishop of Milan, chose four of the ancient modes which he named Authentic. Gregory the Great is said to have added four others called Plagal. Six more were afterward added, making fourteen, two of which were declared imperfect and rejected. There are two kinds of Gregorian modes, the Authentic and the Plagal. The final or keynote of the authentic modes is the lowest note of its scale. Each authentic mode has an attending plagal mode, a fourth below it, the keynote of which is the same as that of the authentic mode. The plagal modes are therefore similar in this sense to the Greek modes, the fourth notes of which were said to be keynotes. The Gregorian modes are numbered, the authentic receiving the odd and the plagal the even numbers. In addition, the old Greek names are used, the plagal modes receiving the prefix hypo, but unfortunately the Gregorian and Greek titles do not correspond, causing great confusion in all references to the modes. Thus, the Gregorian Hypophrygian is the same as the Greek Hyperdorian, and the Gregorian Hypomixolydian with the Greek Phrygian.

As in the Greek modes it is convenient to remember the Gregorian modes by imagining a series of scales, all of natural notes and an octave in compass, beginning on each of the seven notes. These are the authentic modes from which the plagal with their prefix hypo can be readily counted. (It should be remembered that the pitch is entirely relative as in the Greek scales.)

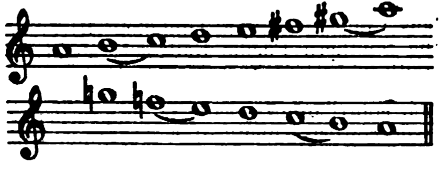


The Gregorian modes are still in use in the Roman Catholic Church, to the services of which it adds a remarkable effect of antiquity and solemnity.

In modern music but two of the old modes remain; the major, equivalent to the Greek Hypophrygian (or Hyperlydian) and the Gregorian Ionian, and the minor, equivalent to the Greek Dorian and the Gregorian Æolian. The choice of these two modes took many centuries and must have been made by entirely unconscious perception of their greater value especially of that of the major scale. A comparison of the major scale with the favorite Dorian mode of the Greeks shows that the modern ear desires the half tone at the top of a tetrachord instead of the bottom, as they did. Whether the favor in which the Dorian tetrachord was held by the Greeks is a proof that they thought their music *downward* and were therefore doing just the same as we do when we think ours *upward* is very doubtful, though a well-known theorist has advanced this clever idea. It is much more likely that the introduction of harmony caused a greatly increased recognition of the true function of the keynote, which, as we understand it, was unknown to the ancients. To us the keynote (in any octave) is the only rest point to the ear; all other notes of the scale trend toward it more or less strongly, and in the instance of an ascending major scale the seventh note (the so-called leading note) demands it more than any other note. This quality of motion and rest led to the greater importance of the major mode over the minor, the seventh note of which, being a whole tone distant from the keynote, lacked the great desire to progress these which is so important a characteristic of the major. Finally, probably by accident at first, the seventh note of the minor was raised so as to be but a half tone below the keynote; this form of the minor key is now known as the «harmonic minor,» and is the only one recognized in harmony.



But the distance from the sixth to the seventh being thus made a tone and a half, a very difficult interval to sing or treat melodically, the sixth was raised to secure a smoother and easier passage upward and as the double change had made the upper part of the minor mode identical with the major it was argued that neither leading note nor raised sixth was necessary in descending, so both were restored to their original position in descending. This is known as the «melodic minor.»



(2) A term used in mediæval music to indicate the relative value of the Large, the Long and the Breve. Two kinds of mode existed, great and less, the first deciding the relation of the large to the long and the second that of the long to the breve. Both kinds could be perfect or imperfect. In great mode perfect the large is equal to three longs. In great mode imperfect it was worth but two longs. In less mode perfect the long was equal to three breves, in less mode imperfect it was equal to two breves. During the end of the 15th century and the beginning of the 16th musicians made extraordinary difficulties in their compositions by means of mode and prolation.

George Gordon Thunder.

Model, in art, an original of any kind proposed for copy or imitation. Models in imitation of any natural or artificial substance are usually made by means of molds of plaster of Paris. In painting this is the name given to a man or woman who is procured to exhibit him or herself in the requisite costume, or in a state of nudity, for the advantage of the students. These models are provided in all academies and schools for painting. In sculpture a model implies a figure made of clay, wax, plaster, or any other suitable substance, which the artist molds to guide him in fashioning his work as the painter first makes a sketch, or the architect a design.

Modena, mō'dĕ-nä, Italy, a city and province, part of a former duchy now comprised partly in the compartimenti of Emilia and Tuscany.

The city, capital of the province, pleasantly situated in a fertile plain, between the Secchia and the Panaro, 25 miles northwest of Bologna, is built with great regularity, and has spacious streets, and fine promenades on the site of its former ramparts. It consists of three parts — the citadel, the old town, and the new town. The most remarkable edifices and establishments are the cathedral, a fine specimen of Romanesque, adorned in front with numerous curious sculptures; the Campanile, erected in 1224–1319, 335 feet high, and one of the finest in North Italy; the church of San Francisco, a handsome Gothic structure, containing a fine terra cotta group of the Descent from the Cross, by Begarelli; several other churches; the ducal palace, begun in the 17th century, but enlarged by numerous modern additions, and forming a splendid structure, now used as a military school; the Albergo Arti or building containing the municipal collections, especially the Estense Library of over 150,000 works, including several thousand MSS., and the picture-gallery embracing a large collection of paintings, several of them by the first masters; the theatre, the baths, the university, several other important educational institutions, and charitable endowments. The manufactures consist chiefly of silk goods, silk twist, woolen and hempen cloths, leather, and glass; the trade, however, is unimportant. Modena is the see of an archbishop, and possesses various important public offices. It existed under the Etruscans, and as Mutina rose to great splendor under the Romans. It afterward was repeatedly sacked by the northern invaders, whose ravages left few vestiges of its ancient grandeur. Pop. (1901) 64,843.

The former duchy bordering on Tuscany, Lucca, Bologna, Mantua, and Parma, had an area of 2,573 square miles, which in 1901 contained a population of 785,930. It is now divided into the provinces of Modena and Reggio in the compartimento of Emilia, and the province of Massa e Carrara in the compartimento of Tuscany. Modena was made a duchy in 1452, the ruler being Duke Borso of the house of Este, to which noble family Modena had belonged since 1288. In 1796 the French took possession of the country and Modena afterward was included in the Cisalpine Republic. By the treaty of Vienna in 1815 it was restored to the Este family. The duchy took an important part in the turbulent proceedings of the 19th century, which led to the consolidation of the Italian kingdom in 1860, when Modena proper was formed into a separate province with an area of 1,002 square miles. Pop. about 325,000. See ITALY.

Modern Analytical Geometry. See GEOMETRY, MODERN ANALYTICAL.

Modern Athens, a euphemistic term for various modern seats of learning, chiefly applied to Edinburgh, Scotland, and Boston, Mass., each celebrated for schools of learning, literary output, and general culture.

Modern Instance, A, a novel by William Dean Howells, published in 1881. The scene of the story is first laid in a country town in Maine, where Bartley Hubbard, a vain, selfish, unprincipled young man, is editing the local paper. He marries Marcia Gaylord, an inexperienced country girl, and takes her to Boston, where he continues his journalistic career. As time goes on, the incompatibility of the young couple becomes manifest; Marcia's extreme jealousy, and Bartley's selfishness and dissipation, causing much unhappiness and contention. The novel can hardly be agreeable, but it shows that its author has seen very clearly into certain unattractive but characteristic phases of contemporary American life; and the story is told with brilliancy and vigor.

Modernism, Pope Pius X on. In a recent utterance, Pope Pius X enunciated the following doctrines,—circulated by the Catholic press,—as his *Motu Proprio.* He deals with the "modernist" movement and propaganda; and, speaking of it, laid down the following conditions and regulations, which he ordered Catholics to follow. He said in part:

"In the first place, as regard to studies, we shall not ordain that scholastic philosophy be made the basis of the sacred sciences. It goes without saying that if anything is met with among the scholastic doctors which may be regarded as an excess of subtlety, or too carelessly stated; if there is anything which does not square with later discoveries, or which is altogether destitute of probability, we have no desire whatever to propose it for the imitation of present generations. And let it be clearly understood above all things that the scholastic philosophy we prescribe is that which the angelic doctor has bequeathed to us. . . . In the vast and varied abundance of studies opening before the mind desirous of truth, everybody knows how the old maxim describes theology as so far in front of all others that every science and art should serve it and be to it as handmaidens. . . . Anyone who in any way is found to be imbued with modernism is to be excluded without compunction from these offices, and those who already occupy them are to be removed. . . Equal diligence and severity are to be used in examining and selecting candidates for holy orders. . . . It is also the duty of the bishops to prevent writings infected with modernism, or favorable to it, from being read when they have been published, and to hinder their publication when they have not. No book or paper or periodical of this kind must ever be permitted to seminarists or university students. . . . The Holy See neglects no means to put down writings of this kind, but the number of them has now grown to such an extent that it is impossible to censure them all. . . . It is forbidden to secular priests, without the previous consent of the ordinary, to undertake the direction of papers or periodicals. . . . Let priests hold as sacred the authority of their prelates, let them take it for certain that the sacerdotal ministry, if not exercised under the guidance of the bishops, can never be either holy, or very fruitful or without blemish. . . . It is impossible to approve in Catholic publications of a style inspired by unsound novelty which seems to deride the piety of the faithful and dwells on the introduction of a new order of Christian life, on new ordinances of the Church, on new aspirations of the modern soul, on a new vocation of the clergy, on a new Christian civilization. . . Ancient relics are to retain the veneration they have always enjoyed, except in those individual instances when there are clear arguments that they are false.

Modern Language Association of America. A society for the advancement of the study of modern languages and their literatures, through the promotion of friendly relations among scholars, the presentation and discussion of papers at meetings and the publication of results of investigations by members. It was incorporated in Baltimore in 1883, and membership is open to all persons on payment of $3 annual dues. For geographical reasons a Central Association was incorporated in 1903, which holds meetings in the Western States independently of the parent body. A new England branch holds meetings annually. The association issues an annual volume of Publications in quarterly instalments. There are about 700 active and 38 honorary members.

Modern Maccabees, Knights of the, an American fraternal organization founded in 1881. It has 1,294 branch tents, or lodges, and a total memberships of 106,883. During 1902, the organization disbursed $1,356,463 in insurance benefits.

Modern Woodmen of America. See WOODMEN OF AMERICA, FRATERNITY OF MODERN.

Modes'to, Cal., city, county-seat of Stanislaus County; on the Tuolumne River, and on the Southern Pacific Railroad; about 80 miles south by east of Sacramento. It is in a productive agricultural region, the system of irrigation contributing greatly to its prosperity. The trade consists chiefly of wool, grain, fruit, and wine. The prominent buildings are the county court-house, county hospital, and churches. Pop. (1910) 4,034.

Modjeska, mŏd-jĕs'ka, Helena, Polish actress: b. Cracow 12 Oct. 1844; d. Bay City, Cal., 8 April 1909. Her father was a musician. In 1860, having married a theatrical manager, Modrzejewski, whose name she has since softened to Modjeska, she began to act, and soon gained local fame. After her husband's death she appeared in Warsaw in 1868, after marrying

Count Bozenta Chlapowski in September of that year. In 1876 she came with the latter to America. In July 1877, at San Francisco, she made her American début as Adrienne Lecouvreur in an English version of the play by Scribe and Legouve. Three years later she was seen in London as Camille, and from that time she was one of the foremost actresses of the English-speaking tragic stage. She starred with Booth in 1889–90. Her best roles were Shakespearian, notably Lady Macbeth, Cleopatra, Ophelia, and Viola.

Modjeski, Ralph, American civil engineer: b. Cracow, Poland 27 Jan. 1861. He came to the United States with his mother in 1876 and, for American naturalization, he changed his name to Modjeski, his mother being the celebrated tragedienne, Helen Modjeska. He was graduated at the College des Ponts et Chaussées, Paris, at the head of the class and with honors. He has built many bridges in the United States, among them being the government bridge at Rock Island and the McKinley bridge at St. Louis. He was in charge of the reconstruction of the Northern Pacific R. R. bridge at Bismarck, N. D., and a member of the board of engineers for the reconstruction of the Quebec bridge. Since 1892 he has been consulting bridge engineer at Chicago. Is a member of the American Society of Civil Engineers, the British Institute of Civil Engineers, the Association Amicale des Ingénieurs Civils des Ponts et Chaussées de France, the American Railway Engineering and Maintenance of Way Association, and the Chicago Engineers Club.

Modoc (mō'dŏk) Indians, tribe of Northern California, which in 1872, after firing on the United States forces, retreated to the neighboring lava beds, and there defended themselves desperately till June, 1873, killing or wounding 132 of the troops. Their chief, Captain Jack, and three others, were hanged in October; about 100 who had not followed him were permitted to remain in California, the rest (145) were transferred to Indian Territory. The Modocs originally made their home on the shores of Lost River and Klamath Lake. They called themselves the *Maklaks*, or "the people." They were always a warlike tribe, and when not fighting emigrants and settlers in the early days, were warring with other tribes in their neighborhood. The surviving Modocs now reside at the Klamath Reservation in California.

Modula'tion, in music, is the act of moving through the sounds in the harmony of any particular key to those of another, or the transition from one key to another. The simplest form is the change from a given key to one nearly related to it, namely, its fifth (dominant), fourth (subdominant), its relative minor, or the relative minor of its fifth. Modulation into the dominant is effected by introducing in any of the parts (rarely in the bass, however) the sharp fourth, which becomes the seventh of the new key; thus, in the key of C, F would be sharpened to effect the transition into the key of G; to pass from that key into that of D it would be necessary to sharpen the C, and so on. In modulating into the subdominant the flat seventh is used, which becomes the fourth of the new key; thus, in passing from the key of C to that of F, the flat B is introduced, and from the key of F to that of B the E is flattened, and so on. The modulation into the relative minor is generally effected by employing the sharp fifth, which becomes the seventh or leading note of the new key; thus in changing from C to A minor the G should be sharpened. As almost every piece ends on the key in which it begins, a second modulation becomes necessary; this is effected by flattening the fifth of the new key if the first modulation is into the dominant, and sharpening the fourth if in the subdominant. When a composer aims at a striking effect he may change from some given key to one quite unrelated, from C to E for instance; but such transitions should be sparingly employed. Modulation is generally resorted to in compositions of some length, for the purpose of catching and pleasing the ear with a fresh succession of chords. See also MUSIC.

Mod'ulus, in mathematics, a constant referring to properties of matter in certain equations. As stress is proportional to strain within the elastic limits, some constant quantity may be introduced, making this proportionality into an equality. In dealing with strength of materials, such a constant is called a modulus. Thus in Hooke's law, which says that extension, as of abar, is proportional to the extending force, the constant which converts this proportionality into an equality is called the modulus of elasticity, or Young's modulus, and is denoted by E. Where the elastic limits are not exceeded, the transverse strain—i. e. the contraction per unit of transverse dimension—is from one-third to one-fourth the longitudinal strain. The symbol denoting the modulus of elasticity of bulk is K. It denotes the lessening of bulk per unit cube, usually per cubic inch, under hydrostatic stress. If P be the shearing stress, and S the shear strain, then p-Ns, where N is the modulus of rigidity. See ELASTICITY.

Moe, Alfred Keane, American consul: b. Buffalo, N. Y., 5 Oct. 1874. He was graduated from Harvard in 1897, and attended the Harvard Law School for one year. After admission to the bar and the practice of law for several years, he entered on his consular career in 1902, being first appointed consul at Tegucigalpa, and serving till 1904. From 1904–9 he was consul at Dublin, Ireland, and in the latter year was transferred, in the same capacity, to Bordeaux, France. He is the author of 'A History of Harvard,' written in a humorous vein, (1896); and 'Honduras' (1903).

Moebius, mé'bē-oos, **August Ferdinand,** German astronomer: b. Schulpforta, Germany, 17 Nov. 1790; d. Leipsic 26 Sept. 1868. He was graduated from the University of Leipsic in 1815, and was for 50 years professor of astronomy there. Through his efforts the observatory was remodeled and by his writings he established a new principle concerning the affinities of figures and proved the close connection between statics and geometry. He published: 'Der Barycentrische Calcul (1827); 'Lehrbuch der Statik' (1837); 'Die Elemente der Mechanik des Himmels' (1843); etc.

Moeller, mĕl'lĕr, **Henry,** American Roman Catholic prelate: b. Cincinnati, Ohio, 11 Dec.

1849. His elementary studies were pursued at Saint Joseph's parochial school and he afterwards attended Saint Xavier's College. In 1869 he went to the American College, Rome, where he followed a seven years' course in philosophy and theology. He was ordained priest in the Church of Saint John Lateran, Rome, 10 June 1876, and after his return to Cincinnati was made pastor of Bellefontaine and later appointed to a professorship in Mount Saint Mary's Seminary, remaining there till 1879. In 1880 Archbishop Elder named him chancellor of the diocese of Cincinnati, and on 25 Aug. 1900 he was consecrated bishop of Columbus, Ohio. In April 1903 the Holy See appointed him Coadjutor Archbishop of Cincinnati with right of succession, and on the death of Archbishop Elder, 31 Oct. 1904, he assumed charge of the archdiocese, the pallium being conferred upon him 15 Feb. 1905.

Moeller, Louis, American genre painter: b. New York 5 Aug. 1855. He worked with his father, a decorater, for four years; studied in Munich with Diez and Duveneck; and in 1883 returned to New York. He became a member of the National Academy in 1895, and has exhibited there since 1883. Among his works are: 'Morning News,' 'Puzzled,' 'Short Measure,' 'An Interior,' etc.

Mœris, mē'rĭs, Egypt, an ancient artificial lake north of Medinet-el-Fayum, until recent years confounded with Birket-el-Keroon (q.v.) — lake of the horn — with which it was connected. According to Herodotus, Lake Mœris was 350 miles in circumference, and about 300 feet deep. He states it to have been entirely the product of human industry. Briket-el-Keroon, about 30 or 40 miles long and 6 broad, is a natural basin. The works, therefore, which Herodotus attributes to King Mœris (Amenemhat III.) are the Bahr Jusuf (Canal of Joseph), which connected Mœris with the Nile, and the canal connecting with the Birket-el-Keroon. The fisheries of the lake were very productive. The revenue derived from them went to the Egyptian queens. The colossal statues described by Herodotus are evidently those discovered at Biahmu at the end of the 19th century.

Mœsia, mē'shĭ-ạ, a province of the ancient Roman Empire, lying north of Thrace and Macedonia, and south of the Danube, corresponding to modern Servia and Bulgaria (q.v.). Its original inhabitants were, according to Strabo, a tribe of Thracians. In 227 B.C. a large body of Gaulish invaders entered Mœsia after the death of their leader, Brennus, and settled there under the name of Scordisci. The Romans first invaded it in 75 B.C., penetrating as far as the Danube. It was not, however, until 29 B.C. that it was finally subjugated. The Visigoths (Mœsogoths) settled here in the 4th century, and it was afterward conquered by the Slavonians and Bulgarians.

Moffat, mŏf'at, **Robert,** Scottish missionary to South Africa: b. Ormiston, East Lothian, 21 Dec. 1795; d. Leigh 8 Aug. 1883. He obtained an ordinary education; became a gardener; and about 1813, being deeply moved by the story of some Methodist missionaries, decided to go to Africa, whither he was sent in 1816 by the London Missionary Society. His first work was in Namaqualand, where he made a convert of Afrikaner, a Hottentot robber; later he settled among the Bechuanas in Kuruman, where his wife, daughter of his former employer, who married him in 1819, joined him and helped him greatly. Moffat, with the assistance of several other missionaries, translated parts and finally all of the Bible (1872) into the language of Bechuanaland. He returned to England in 1870, where his wife died in the following year, and spent the last years of his life in rousing interest in South African missions. One of his daughters married Dr. Livingstone (q.v.), the missionary and explorer. Consult: 'The lives of Robert and Mary Moffat,' by John S. Moffat, their son (1885).

Moffat, William David, American publisher and author: b. Princeton, N. J., 17 Jan. 1865. He was graduated from Princeton University in 1884 and entered the publishing business. In 1897 he became business manager of 'The Book Buyer' and of 'Scribner's Magazine.' He has written: 'The County Pennant'; 'Brad Mattoon'; 'Not Without Honor'; etc.

Mogul, mō-gŭl', the same as Mongol, applied particularly to the sovereigns of Mongolian origin, called Great or Grand Moguls, descendants of Tamerlane, who ruled in India from the 16th century.

Mohair. Mohair is the commercial and technical name of the fleece of the Angora goat. The word comes to the English through the Old French *mohere*, from the Arabic *mukhayyar*, meaning mohair cloth. In color mohair is pure white, except in rare cases, and grows in ringlets. The hairs composing a fleece are of varying lengths, but the average annual growth of the long hairs, which largely predominate, is about 10 inches. The hairs are not composed of epithelia, as is the case with wool, and therefore the felting property characteristic of wool is wanting. In fineness mohair is variable with the individual animals, and is placed between the fine and coarse wools; in lustre, durability, and strength it has no equal among fibres.

The only vitiating feature of mohair as it comes from the animal is the intermixture of an undercoat of lustreless, chalky-white hairs which vary in length from one to three inches, and vary in total amount according to the breeding of the animal. This undercoat is known technically as "kemp," and the principal objection to it is that it does not take the fast dyes. It becomes necessary, therefore, to remove the kemp from the mohair used in the finest fabrics, and this work is done by a comb which, in removing the kemp, also takes out every mohair fibre of equal length or shorter than the kemp. This entails a loss ranging from 10 to 30 per cent, but the average is becoming smaller as better goats are developed.

The lustre of mohair is very pronounced, and no amount of washing, dyeing, or other manipulation will dull it. Its durability is remarkable, and because of this fact it enters largely into goods of fine quality but which are subjected to hard usage, such as railway plush. Fast dyes have such an affinity for it that sunshine and storms have no effect on its brilliancy.

The uses of mohair are multifarious, and are capable of wider expansion as the supply of mohair becomes larger. Its largest use is in the manufacture of plush. Practically all of the railway plush of the world is made of mohair, and also large quantities of furniture plushes of varying qualities and numerous designs. It enters into brilliantine, zibeline, and crepon dress goods, coat linings, so-called alpaca goods, imitation Astrakhan for capes, coats, and muffs, and many other fabrics under trade names which do not show what the goods are.

There are about three countries producing mohair in appreciable quantities as yet: Turkey in Asia, with 10,000,000 pounds annually; South Africa, with 12,000,000 pounds annually; and the United States, with 2,000,000 pounds annually. (These figures are approximated.) The prices ruling in the United States are from 25 to 45 cents per pound. In New England and New York there are mills which consume all of the American product, besides importing large quantities of Turkish and South African hair from Bradford, England.

George Fayette Thompson,
Author of 'Mohair and Mohair Manufactures.'

Mohair Goat, the Angora goat. See Goat.

Mohammed ("The Praised One"; also written: Mahomet; Muhammad, the Arabic form; Mahmoud; Mehemet; etc.), Prophet and founder of Islamism, generally called by Christians Mohammedanism (but not so called by the followers of the faith of Islam): b. Mecca, Arabia, probably in April 569 A.D. (according to some authorities 570 and 571 A.D.); d. Medina, Arabia, 8 June 632 A.D. Mohammed was not born in the lowly state of life that we might be led to believe by some of the tales of his early life. On the contrary his progenitor, Hashim, of the illustrious tribe of Koreish, was the great benefactor of Mecca and the guardian of the Caaba, which alone vouches for his high position, as this honor was never conferred except upon those belonging to the most honorable tribes and families. Abdul-Muttalib, his son, succeeded to these honors, and the guardianship of the Caaba was confirmed in the line of Hashim by his valiant action in saving the sacred city from the onslaughts of the Christians of Abyssinia. Abdul-Muttalib had many children, and Abdallah was the youngest and most beloved. He was remarkable for personal beauty and possessed the secret of winning the hearts of women. He married Amina, of the tribe of Koreish, and on the night of the wedding, we are told, two hundred maidens died of broken hearts.

Mohammed was the only fruit of this marriage, and his father died two months after, leaving no other inheritance than five camels, a few sheep and a female slave. It is difficult to reconcile this fact with his former exalted position, but we are assured that it is true by the followers of the faith of Islam, as we are also asked to believe the statement that Amina suffered none of the pains of childbirth, and that Mohammed, on the moment of coming into the world, raised his eyes to heaven and exclaimed, "God is great! There is no god but God, and I am his prophet." Legend also tells us that wonderful signs and portents took place at the moment of Mohammed's birth. Lake Sawa dried up, and the sacred fire of Zoroaster which the Magi had kept burning uninterruptedly for over a thousand years, was suddenly extinguished, and all idols fell down. The massive palace of Khosrau, king of Persia, shook to its foundations and several of its towers were thrown to earth.

When Abdallah died, Amina's grief was so great that it dried up her breasts, and she was forced to look for a nurse among the females of the Bedouin tribes. At length Halima, the wife of a Saädite shepherd took him into the mountains and nursed him, but returned him to his mother at the end of two years because he had epileptic fits. His mother died when he was six years old, and his grandfather, Abdul-Muttalib, adopted him. On Abdul's death, an uncle, Abu Talib, took the lad, brought him up and remained his closest companion and devoted protector throughout his life. His uncle was a merchant and brought Mohammed up in the same line. On one of his trips to Syria, he visited a Nestorian monastery and there imbibed many ideas the results of which show in his subsequent life. Even in his youth he carried religious contemplation to an extreme, and it is believed that his epilepsy had much to do with this morbid tendency in his character. Wonderful mental faculties are ascribed to him from his youth up, but as a matter of fact he was just as illiterate as most of his countrymen. When he was 25 years old he was employed by a rich widow, Kadijah, also of the tribe of Koreish. He displayed such good judgment and business qualities in caring for her caravans and other commercial interests that, in spite of the fact that she was already twice widowed, she married him. She was 15 years older than Mohammed, but bore him two sons and four daughters. Al-Kasim and Abd Allah, the two sons, who were respectively the oldest and the youngest of his children, both died in early youth; the four daughters survived — Fatima, Zainab, Rukaiya and Umm Kulthum. He lived with his wife in faithful and happy wedlock till her death.

With his marriage Mohammed acquired great wealth, and this gave him leisure to indulge the original bias of his mind; his old habits of contemplation were revived and he spent much time in religious speculation. His judgment and probity were widely respected and he seemed to be endowed with many wonderful gifts. There was a steady growth in his zeal to abolish idolatry and other evils, and to substitute a new and purer faith. This was fostered by his intercourse with Jews and Christians whom he was forced to meet in his journeyings. The idea of a new religion finally engrossed his whole mind and influenced his every action. He believed he saw the necessity for it; all sorts of new dogmas were creeping into and rapidly undermining the faith of his forefathers. During the first centuries of the Christian propaganda religious doctrines were more numerous than the stars in the sky; both Christianity and Judaism had crept into Arabia, Zoroastrianism was on the wane, and people refused any longer to accept and conform to the old pagan superstitions. Othman, Zaid and even Waraka, one of his wife's relatives, who had embraced Judaism, were preaching against the futility of star-worship, and their followers were ridiculing fetishes, ceremonies and even the temples. Many were being exhorted to Judaism while others were embracing Christianity, and others still were falling away altogether. Everyone was looking for a religion which should embody the faith of their forefathers with the simple doctrine of the unity of the Deity. This picture presented itself to Mohammed with all its attendant consequences. Something had to be done — the time was ripe, and Mohammed stepped into the breach, launching the faith of Islam. He went back to the beginning of things, and adopted as a hypothesis that God had inculcated in Adam the one and only true religion — the worship of one indivisible and only God, the Creator. He believed that this religion of Adam had been repeatedly debased, and almost forgotten at times, but that a succession of prophets was destined to come into the world to restore it from time to time and bring men's minds back to the original idea — such prophets were Noah, Abraham, Moses and Jesus Christ. These had all fulfilled their respective missions, but man now needed another guide to bring him back to God. It is not to be wondered at that Mohammed looked especially to Abraham, the father of Ishmael, the progenitor of his own race, as one of the greatest of these. With the development of this idea of the oneness of God grew Mohammed's mission as he conceived it. We can scarcely doubt that he was honest in his convictions and in his purpose when he first undertook the reformation of the world, which he really began at the age of 40 years. It is a matter of opinion as to whether he continued to give his efforts in a purely unselfish way during the later periods of his life. It would seem that his original honesty of purpose became lost in his efforts for personal aggrandizement, the ambition to assume the prophetic character, and the possible influence of his hereditary disease, epilepsy. Be this as it may, let us follow out his life and see what he accomplished.

Mohammed's first convert was his wife, Kadijah, to whom he told the particulars of an interview which he claimed to have had in a vision with the angel Gabriel, who declared him to be the apostle of God. He was passing, as was his custom, the month of Ramadan in the cave of Mount Hara after fasting, prayer and meditation, when the angel Gabriel appeared to him, displaying a silken cloth covered with writing. «Read!» said the angel. «I know not how to read!» replied Mohammed. «Read,» repeated the angel; and immediately he was illumined with celestial light and understanding, and read what was written upon the cloth, which contained the decrees of God as afterward promulgated in the Koran. Through his wife, her uncle, Waraka, was won back from Christianity and became serviceable to Mohammed on account of his great knowledge of the Old and New Testaments. The next to be converted were the fiery Ali, his nephew, and Zaid his faithful servant; also Abu Bekr, a man of high position, at whose solicitation ten of the best citizens of Mecca joined the faith. Mohammed confided his revelations only to members of his household for a time, and was laughed at by some and reproached by others — Abu Lahah, an uncle, called him a fool, and Abu Talib his adoptive father, while always protecting him, never actually confessed belief in his works. Mohammed personally instructed all his early converts in the doctrines of the new faith of Islam. After four years Mohammed's converts numbered but 40, and they were obliged to hold their meetings in secret in a cave near Mecca. Even here they were discovered and attacked by a rabble. Mohammed had much to contend with in these early days; many members of his tribe were against him, and Abu Lahib, his uncle, a rich and influential man, openly and rancorously opposed what he called Mohammed's heresy.

In answer to a vision Mohammed now began to preach publicly, and summoned all the Koreishites of the line of Hashim to meet him on the hill of Safa. Scarcely had he begun his discourse when Abu Lahib attempted to hurl a stone at him. Mohammed turned, cursing the hand thus raised against him and predicting his doom, with the further assurance that his wife Omm Jemil would help build his death-fire. Mohammed soon called another meeting and this time boldly announced his divine command to impart his revelations received from heaven. At this meeting he called for a vizier or vicegerent; Ali was selected as he alone volunteered. Although the doctrines of Mohammed were received thus ungraciously by his family and friends, he soon found a following among the people at large. He threw off all reserve and worked assiduously for his cause, proclaiming himself a prophet sent by God to put an end to idolatry. His favorite places of preaching were the sanctified hills of Safa and Kubeis; Mount Hara was his Sinai, whither he retired for contemplation and fresh revelations. He was often attacked with open force by his enemies, and in the 10th year of his prophetic office was deprived by death of his faithful wife Kadijah and Abu Talib. He then retired to the city of Taif but kept gaining numerous followers, among others many inhabitants of Medina. About this time occurred his famous vision in which he claimed to have made a nocturnal journey to heaven on the beast Al Borak, as referred to in the Koran. Shortly after, a conspiracy to murder him was set on foot, and he was obliged to flee to Medina. This took place in 622 A.D., and is known as the Hegira («flight») and marks the beginning of the Mohammedan era.

Mohammed was accorded a warm reception in Medina and set about promulgating a systematic propaganda of his doctrines. He organized the followers of the faith of Islam, and provided set forms of worship and religious observances; he proselytized the Jews and other sects in the neighborhood and made many concessions to draw them to the new faith. As a result he was made judge and then ruler of Medina, and boldly assumed regal authority and dignity. After marrying Ayesha, the daughter of Abu Bekr, he announced his determination to take up the sword in furtherance of his doctrines. The hope of plunder thus held out brought him hordes of followers. His first expedition attacked a rich Koreishite caravan led by Abu Sofian, and rich booty was secured and divided. But Abu Sofian returned shortly with 3,000 soldiers and utterly routed Mohammed who had but 1,000. Mohammed, badly wounded, managed to escape. He rallied his troops, however, and gained new followers, by seductive promises, explaining that the defeat was due to the sins of his adherents. In 627 Abu Sofian again brought an expedition against him and laid siege to Medina with a force of 10,000 men. After 20 days, however, his forces broke and dispersed on account of internal discord. Mohammed then led his army against the Jews who had sided with the Koreishites, and took a bloody revenge. Over 700 men were massacred, and the women and children were carried into slavery. From this time on Mohammed's thirst for warfare and blood seemed to be insatiable. At the same time his whole nature apparently underwent a change and he began to give way to the most sensuous practices. He introduced a special chapter in the Koran to give himself permission to marry Zainab, the wife of his former slave Zaid. He followed this from time to time with numerous other marriages and amours and multiplied them to such an extent that at the time of his death he had no less than nine wives. All these affairs he explained by his divine mission, although they were diametrically opposed to his own laws as set forth in the Koran. His ambition and his views continued to expand with numerous successes in warfare and the tremendous growth in the number of his now almost worshipping converts. He gradually conquered all the small surrounding tribes of Arabia; and then becoming still more ambitious and arrogant, sent deputations as missionaries beyond the frontiers. He sent to Khosrau Parviz, king of Persia; Heraclius, emperor of Constantinople; Mokawkas, ruler of Egypt; the king of Ethiopia, and the princes of various districts of Arabia, to embrace the new revelation of the divine law made through him. The stronger and more remote principalities rebelled, but the weaker at once adopted the faith of Islam. The king of Persia and Amru, the Ghassanide, rebelled, and Amru had the ambassador from Mohammed executed. This caused the first war between the Moslems and the Christians. The Moslems were beaten with great loss.

Mohammed now saw the importance of regaining the holy city and prepared what afterward came to be known as the "First Pilgrimage." In 629 he appeared before the gates with 1,400 of the faithful. He succeeded in making a peaceful entrance into the city, telling the Koreishites that he was on a mission of peace and wished only to worship in the Caaba. He and his followers were granted three days for this purpose and left on the fourth day, but not without having won over many Koreishites to the new faith, among them being Amru, Othman, and Khaled. Soon after this Mohammed nearly died from the effects of poison administered to him by a Jewess.

He now determined to wrest Mecca from the hands of the Koreishites; in 630, or the 8th year of the Hegira, he marched against the city with 10,000 soldiers. The inhabitants, seeing the futility of attempting any resistance, gave up the holy city into Mohammed's hands, receiving their life and liberty providing they accepted the faith of Islam. The Caaba was refinished, the idols thrown down, but Mohammed wisely refrained from destroying the ancient Black Stone, regenerating it with his own holy touch. Thus the temple became the sanctuary of the faith of Islam. This exercised a wonderful effect all over Arabia and the next year (9 of the Hegira) embassies arrived from all points of the compass to make submission to Mohammed. This is called "The year of Embassies."

In order to intimidate Heraclius, the emperor, Mohammed marched into Syria half way to Damascus, at the head of an army composed of 20,000 foot soldiers and 10,000 horse, but returned to Medina without making an attack. He then extended free worship to the Christians in consideration of tribute, added a new chapter to the Koran, revoking all regulations in favor of idolaters, and then promulgated his great and last pilgrimage to Mecca, known as the "Valedictory Pilgrimage." This was, perhaps, the most important event of his life. It was toward the close of the 10th year of the Hegira that he started this immense pilgrimage to Mecca, accompanied by a throng which has been variously estimated at from 40,000 to 150,000 persons. He preached to them from Mount Arafat, exhorting the faithful to piety and righteousness, to abstain from sin and to protect the weak. On his return to Medina he shortly fell sick and declined rapidly. He gave instructions that Abu Bekr and Usama, the son of Zaid, should be the leaders of the army, and expired in the arms of his favorite wife Ayesha, 12th day, 3d month, year 11 of the Hegira (8 June 632 A.D.) He was buried in the house of Ayesha where he died. It afterward was annexed to an adjoining mosque which became a place of pilgrimage for generations of Mohammedans.

Mohammed's personal appearance, as far as we are able to judge from Arabic tradition, was neither imposing nor pleasing, but inspiring. He was not above medium height, but was broad-shouldered and deep of chest; he was strongly and compactly built; head, large; brow, high; face, round and ruddy; mouth, large; nose, long and aquiline. His eyes, large, black and fiery, were full of his peculiar magnetic personal power. He wore his black hair long and curly and his beard remained unwhitened at his death. A large birthmark between his shoulders was looked upon as the holy mark of prophecy. His personality was strong and dominant, but his domestic life was as simple as was his frugality at meals. He was kind and generous, a tender father and a loyal friend. Even at the height of his power he lived in a miserable hut, slept upon straw, and his pillow was made of palm leaves covered with leather. His life was withal a strange contradiction, for at times he was deceitful, cunning and cowardly, and in his later years gave way to gross sensuality. His mind in spite of his religion contained a strong admixture of superstition; he believed in omens, charms, and good and bad spirits. Spasmodic convulsions always accompanied his visions or divine revelations, and by many were attributed to his disease of epilepsy. At such times he would perspire profusely and remain in a weakened condition for some time after.

As a political leader and a religious reformer Mohammed undoubtedly ranks among the greatest. Whether he were a real prophet or a charlatan, or a mixture of both, we cannot strip him of the qualities of greatness. His name has survived 12 centuries and his followers to-day number over 175,000,000 living souls. See ISHMAELITES; KARMATHIANS; KORAN; MOHAMMEDANISM; SUNNITES; WAHABEES; SUNNA; etc. Consult: Biographies by Sir William Muir (1851–61; abridged 1894); Nöldeke (1863); Weil (1864); Sprenger (1869); Krehl (1884); Lamairesse and Dujarric (1898); also, Wellhausen, 'Muhammed in Medina' (1882); August Müller, 'Der Islam im Morgen- und Abendlande' (1885); Muir, 'Mahomet and Islam' (1887); Seyd Ali, 'Life and Teachings of Mohammed' (1891); Muir, 'The Caliphate'

(1891); Pool, ‹Studies in Mohammedanism› (1892). Also consult other works quoted under MOHAMMEDANISM; KORAN; and kindred subjects.

ARTHUR S. WITHERSPOON,
Editorial Staff, ‹Encyclopedia Americana.›

Mohammed I., Turkish sultan: b. 1375; d. 1421. He was son of Bajazet I., after whose death (1403) he became prince of Asia Minor and rival of his three brothers for the throne, to which he came in 1413, as the successor of Mousa. During his reign of eight years he strengthened the empire, which was suffering from the recent assaults of Timur (or Tamerlane), pushed its boundaries as far as the Danube, and fostered kindly relations with the Greek empire abroad, and literature, arts, and sciences at home.

Mohammed II., Turkish sultan: b. Adrianople, 1430; d. 1481. He succeeded his father, Murad II., in 1451; two years later undertook the siege of Constantinople, which he carried by storm after 53 days' siege; made the city his capital; made war on the Greek rulers in Morea and Trapezus, on Hunyadi of Hungary, on Scanderbeg, and on Venice, winning for his empire the provinces of Bosnia and Servia, as well as Eubœa and Scutari (from Venice) and Kaffa (from Genoa), and for himself the names el-Ghazi, «the Conqueror,» and Buyuk, «the Great»; and in 1481 had seized Otranto as a preparatory step to war on Naples when he suddenly died.

Mohammed III., Turkish sultan: b. 1566; d. 1603. He succeeded his father, Murad III., assuring himself the throne by the execution of his 19 brothers. He captured Erlau in Hungary (1596), but was unsuccessful in his further movements in Europe, being attacked in Asia by Abbas the Great, Shah of Persia.

Mohammed IV., Turkish sultan: b. 1642; d. 1691. His father, Ibrahim I., was murdered by the Janizaries, when Mohammed was only seven years old. He came to the throne under the nominal regency of his grandmother, which was soon exchanged for the actual control of the grand-viziers, the Kiuprili. Turkey's foreign policy was aggressive and successful under them; but in 1683 Kara Mustafa was defeated before Vienna. The Holy League, composed of Poland, Russia, Venice, and Leopold I., Roman emperor, then steadily gained victory after victory over the Turkish army, which rose against Mohammed, imprisoned him in 1687, and let him die in chains four years after the accession of his brother, Suleiman II.

Mohammed Ahmed, äh'mĕd. See MAHDI, THE.

Mohammed Amir Hasan Khan, ā'mēr hä'sĕn khän, Indian soldier, legislator, and author: b. India 16 June 1849. He was educated at Benares and Lucknow, served during the Mutiny, and received for his conduct a sword of honor at the great Lucknow durbar. From 1866 to 1900 he was in the legislature of Oudh, and at one time was a member of the legislative council at Calcutta. He published translations from Persian and Arabic into English, and three volumes of original poems.

Moham'medan Architecture. See ARCHITECTURE, *Moslem.*

Mohammedan Art. Although Mohammedan Art has no existence in the narrower sense of the word, there are nevertheless three aspects in which the subject is important. By the student of religion, Islam's attitude toward art deserves consideration; and the artistic possibility of the Arab mind, and the channels through which the artistic feelings, denied any true outlet, found expression, are of interest to the student of Islamic thought and civilization.

Any tendency toward art in Islam was crushed in the early days of that religion by Mohammed's personal attitude toward painting and sculpture. In the Koran, sura 5, v. 92, are found the following words: «O true believers, surely wine and lots and images . . . are an abomination and the work of Satan; therefore avoid them that ye may prosper.» Again in two well-known traditions Mohammed stated that he who made a likeness of a man would, on the Great Day, be asked to furnish a soul for him also; failing in this he would be consigned to hell. He once said, «God sent me against three kinds of men; the proud, the polytheist, and the painter; take care, therefore, not to represent either God or man; but only trees, flowers, and inanimate objects.» Such a sweeping prohibition as this well nigh dealt the death-blow to any attempt at expressing the feeling in any form, outside of language. The reverence paid to the utterances of Mohammed may be seen in the pious Moslem's custom of using only plain pieces of ivory in the game of chess; Mohammed's stricture being understood to apply to the images of horse, man, and elephant used in that game. Mohammed's attitude, therefore, toward those things which constitute art, in the narrower sense of the word, was occasioned by his religious scruples against any representation that might serve as an object of worship.

Had it not been for this attitude of early Islam, art might have developed among the Arabs, and later among the adherents of Islam, to a surprising degree. There are many characteristics of the Arab mind, which they impressed on those who adopted their religion, that might have created a unique school of art just as Islam is a unique religion. The Arab, in his native home had little that would help him in establishing any definite lines of form capable of serving as a basic principle in production. There was little to suggest any definite lines of demarkation in the sandy deserts extending as far as the eye could reach. Yet it is due to this fact that in the Arab a lawless, fantastic imagination was cultivated which, had it been directed along proper lines, as it would have been under the influence of the superior culture of those they conquered, might have been prolific of great results. It is probable, also, that in the desert the Arab received his lessons in color, the intensity of which was rendered very high by the clarified atmosphere. In the verdure that did exist in the fertile regions he has been largely influenced by the waving graceful lines of the palm trees, lines which are reproduced in the domes that decorate the mosques.

The Moslem, however, has found many fields in which the artistic principle might express itself, and as decorators they are second to none. In combinations of colors there are always certain principles observed that render the object pleasing to the eye. This holds true of mural ornamentations as well as of the colors introduced into woven goods and glassware. In buildings these colors were combined with gold and marble in rich profusion. Hur, governor of Mosul (106 to 117 A.H.), had a palace of pure white alabaster, the walls of which were inlaid with stones of different colors, set off with beams of carved teak. This palace was known as the *mankusha*, «painted.» In more pretentious buildings floors were often paved with marble, each slab of which was separated from the next by bands of gold. Artistic blending of colors and intricacies of designing were found in the woven stuff, for which Oman was especially celebrated. A favorite style was that in which gold thread was run through colored cloth. In Damietta beautiful specimens of this art were common. Silk or half-silk cloth of various colors were woven with arabesques of gold. Other patterns, in defiance of prejudice, consisted of the images of horses, birds, elephants, etc. Sometimes hunting scenes were depicted. Much of this work was done by the Copts.

In the production of glassware Syria early excelled. Glass of many colors was produced profusely ornamented with gold. These soon became articles of luxury; and one native historian mentions a goblet that came from the treasuries of the Fatimides, which sold for 360 dinars. From the same treasuries 18,000 glass vessels were sold. These glasses were either engraved with figures, within and without, or burnt in many colors. The arabesque is a style of ornament carried to a high degree of beauty. One of the main points in this design consists in excluding any representation of natural flowers or vines. Conventional vines and flowers are common, however, and these are set off with inscriptions, or combinations of lines and circles. Color is then added, «distributed with exquisite tact as regards high notes and neutral tints.»

Sporadic mention is made of painters, and some few names are saved by the historians Makrizi and Abul Fida; but painting like gilding was almost entirely confined to mural decoration. A story, interesting in that it shows that the Moslem's attitude toward art was not always what it should be may be mentioned here. Two painters, Ibn Aziz and Kosair, agreed each to paint a figure for a certain vizier, one figure to seem to enter the wall on which it was painted, the other to seem to spring from the wall. This they did. Kosair painted a dancer in white garments against a black background; and Ibn Aziz painted his dancer in red on a yellow background. As each painter substantiated his claims the vizier rewarded them richly.

The Arabic alphabet was a field upon which the artistic ingenuity of the Moslem was expended with good results. The older Cufic characters were soon supplanted by more graceful, flowing letters with many ligatures and rich voluptuous lines. These characters easily lent themselves to intricate systems of interweaving with which the walls of mosques might be decorated. Verses of the Koran were used for this purpose, and were reproduced in letters of gold, on white marble. Sometimes glass of highest finish was used for these inscriptions. They were generally white and blue. One artist, whose skill in the formation of such inscriptions was well known, lived in the time of Walid I. He is the artist who wrote the gold inscription in the Prophet's Mosque at Medina, an inscription which consists of several short suras of the Koran. Houses also were decorated with these inscriptions from the Koran or the Poets. Many doors are ornamented in Egypt with inscriptions set off by colors, though this is a superstition in this case.

It was in Spain, however, among the Moors, that art reached its highest development. Here painting and sculpture were cultivated and were used extensively for decorating palaces and houses. The civilization attained by the Moors when the rest of Europe was sunk in ignorance has been a theme on which historians have dwelt at length. Artistic handiwork of all kinds was excelled in; even keys were exquisitely decorated. «Potters had attained to the art of producing a ware shining with iridescent gold or copper lustre.» In the great mosque of Cordova there was a pulpit «constructed of ivory and choice wood, in 36,000 separate panels, most of which were encrusted with precious stones and fastened with gold nails.» There were also numerous works of sculpture and paintings found in az-Zahra. The sculptured lions and paintings of Alhambra, still to be seen, show to what extent the arts progressed among the Arabs of Spain.

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Mohammedan Literature. See Arabia, *Literature.*

Mohammedanism is the term frequently given to the religion taught by Mohammed; but it is not used by the followers of that religion. Abu-Bekr, the first caliph, is reported to have said that it is not Mohammed, but the God of Mohammed, that we worship. The term by which the religion is known, wherever professed, is Islam, «submission to the will of God.» Those who embrace Islam are called Muslim (frequently written Moslem), a participle of the same stem from which the verbal noun Islam is derived. Still another term, used as the equivalent for Moslem, is Mumin, «believer.» It, likewise, is a participle, formed from the stem that gives rise to the word Imân, «faith.»

Islam is the religion professed by Turkey, Syria, Palestine, Arabia, Persia, Asia Minor, Afghanistan, Baluchistan, Turkestan, and the Malay Peninsula. India has more than 57,000,000 Moslems. China has about 25,000,000. Owing to the great difficulty of securing exact figures from many of the places where Islam is supreme, an accurate statement as to the number of its adherents is impossible. It is generally estimated at 175,000,000.

Islam is divided by the theologians into two heads: Imân, «faith,» and Din, «practice.» The separate articles of both heads are determined by the Koran, the Traditions or sayings of Mohammed, and the decisions of the learned officials. Under Imân are given six cardinal points of belief, as follows: belief in God and his unity; belief in angels, and good and bad spirits; belief in the Koran and revelation; belief in the Prophet; belief in the resurrection and the judgment day; belief in God's absolute rule of the world, «There is no god but Allah, and Mohammed is his envoy.»

The latter part of this statement will be treated of in its proper place; here it is Islam's conception of the deity that must be set forth. He is above all omnipotent. No phrase occurs more frequently than this: «and he is powerful over all things.» He is omniscient; «And he knoweth all things,» is a phrase equally often met in the Koran. «With him are the keys of the secret things; none knoweth them besides himself: he knoweth that which is on the dry land and in the sea; there falleth no leaf but he knoweth it; neither is there a single grain in the dark parts of the earth, neither a green thing nor a dry thing but it is written in the perspicuous book.» (Sura 6, 59.) «He is the ever-living, eternal God.» «God! there is no God but he; the living, the self-subsisting; neither slumber nor sleep seizeth him; to him belongeth whatsoever is in heaven or on earth.» (Ibid.) He is, moreover, the creator of all things. «His is the kingdom of heaven and earth; he giveth life and he putteth to death; and he is almighty. He is the first and the last; the manifest and the hidden; and he knoweth all things. It is he who created the heavens and the earth in six days, and then ascended his throne.» (Sura 57, v. 2.) His word alone creates, «When he decreeth a thing, he only saith unto it, 'Be, and it is.'» (Sura 3, v. 4), cf. (Sura 11, v. 9). As a creator he works not as man works. «We created the heavens and the earth and whatever is between them, in six days, and no weariness affected us.» (Sura 50, v. 37.) Mohammed's account of creation, founded on the Old Testament account, is rather confused, especially his ideas as to what acts of creation were performed on the separate days. His assertion «no weariness affected us» (God is the speaker, of course) is a refutation of the Jewish idea, as he understood it, that God needed a rest day.

He is not only creator of all things, but ruler of all things, and protector as well. «It is he who causeth you to sleep by night, and knoweth what ye merit by day; he also awaketh you therein, that the prefixed term of your lives may be fulfilled. . . . He is supreme over his servants, and sendeth his guardian angels to watch over you, until, when death overtaketh one of you, our messengers cause him to die; and they will not neglect our commands. . . . Say, who delivereth you from the darkness of the land, and of the sea, when ye call upon him humbly and in private, saying 'verily, if thou deliver us from these dangers, we will surely be thankful.' Say, God delivereth you from them and from every grief of mind.» (Sura 6 v.) His care is always assured to those who follow his way. «Say, my Lord hath commanded me to observe justice; therefore set your face to pray at every place of worship, and call upon him, approving unto him the sincerity of your religion. . . . A part of mankind hath he directed.» (Sura 7, 28.) «Whoever therefore shall deny Tagût and believe in God, he shall surely take hold on a strong handle, which shall not be broken; God is he who heareth and seeth. God is the patron of those who believe; he shall lead them out of darkness into light.» (Sura 2, v. 257.)

Though he is the ruler of all things and may do as seemeth good in his sight, yet is he a just God, and punishes only where punishment is due. «We will appoint just balances for the day of resurrection; neither shall any soul be injured at all; although the merit or guilt of an action be of the weight of a grain of mustard seed only, we will produce it publicly; and there will be sufficient accountants with us.» (Sura 21, v. 48.) Those who suffer have gone astray or are being prepared for better things. «Every soul shall taste of death; and we will prove you with evil and with good, for a trial of you.» (Sura 21, v. 36.) Of those sorely tried it is said: «I have this day rewarded them, for that they suffered the injuries ye offered them, with patience; verily they enjoy great felicity.» (Sura 23, 113.) As he is a just God, every creature is responsible to him, and must answer for his choice of good or bad, «Did ye think that we had created you in sport, and that ye should not be brought again before us? . . . whoever, together with the true God, shall invoke another god, concerning whom he hath no demonstrative proof, shall surely be brought to an account for the same before his Lord.» (Ibid. v. 117.)

Though God is just, he is also merciful. «We do not lay upon any soul more than it can bear.» (Sura 6, v. 153.) Like the God of the Hebrews he puts off the evil day in the hope that man may repent. «If God should punish men for their iniquity, he would not leave on the earth any moving thing: but he giveth them respite unto an appointed time.» (Sura 16, v. 163.) The reconciliation, however, of mercy and justice was a problem that never occured to Mohammed.

Another problem that Mohammed, very wisely, never considered is that of freedom of choice and God's absolute decree. Though the latter is a separate article (the sixth) of Imân, a brief statement of it will be given here. Everything that has happened or that will happen, has been already fixed by God. «Say, nothing shall befall us, but what God has decreed for us.» (Sura 9, v. 51.) «No soul can die unless by the permission of God, according to what is written in the book containing the determination of things.» (Sura 3, v. 141.) «He hath formed his creatures; and . . . determined them to various ends, and directed them to attain the same.» (Sura 87, v. 2.) These and other passages in the Koran show that Mohammed was a firm believer in God's absolute decree of all things. He was no theologian, however, so there arose no question about this decree and man's free will. His attitude to the question may be shown by a quotation from sura 4, v. 80. «If good befall them they say it is from God; but if evil befall them, they say; this is from thee, O Mohammed: Say, all is from God; but what aileth these people that they are so far from understanding what is said unto them? Whatever good befalleth thee, O man, it is from God; and whatever evil befalleth thee, it is from thyself.» He, as a religious man, could get no further than this contradiction, and he adjured his followers never to dispute over these points.

It is impossible to discuss here all the attributes and activities of God as they are given in his 99 names; but there is one more aspect of the Moslem's belief in God that must not be neglected. It is the most important attribute of the deity, and its statement is found in sura 112. «Say, God is one God; the eternal God; he begetteth not, neither is he begotten; and there is not anyone like unto him.» In sura 19, v. 91, we read: «They say, the Merciful has begotten issue. Now have ye uttered an impious thing." These quotations show the Moslem's attitude toward Christianity. In Islam there is no Trinity; there is no Fatherhood; God has taken to himself no son; but is alone in his glory and power. Christ, to the Moslem, is a prophet. He was the word of God "conveyed into Mary." Islam, failing utterly to grasp the significance of Christ's life, could not accept the idea of his crucifixion. They have therefore found an end that they deem more worthy of a prophet, and in the Koran we read that one in the likeness of Christ was crucified.

Joined to the statement of the first great truth of Islam, "There is no god but God," is another statement considered by Moslems to be just as important; "and Mohammed is the envoy of God." Concerning his divine mission, Islam knows no doubt. He was the last and the greatest of all the prophets — "The seal of the Prophets." Of prophets, thousands are recognized by Islam; but there are six, only, deemed great enough to be the holder of a title; they are: Adam, Noah, Abraham, Moses, Jesus, and Mohammed. As a prophet, Mohammed announced himself to the world when he first recited the 96th sura: "Read in the name of thy Lord who hath created all things." He never claimed to be more than the envoy or prophet of God, and as such only is he reverenced by the intelligent Moslem. His tomb at Medina is an object of veneration to the Moslem world and should be visited by every pilgrim. His intercession may be asked in prayer; for he was the friend of God. Five times every day Islam testifies to its faith in God and its veneration for the prophet. Every Moslem must believe in revelation, "that which is sent down." (Sura 2, v. 3.) Beginning from earliest times, there have been numerous revelations, each of which was a law for mankind, till superseded by the next. So each of the six prophets mentioned was the recipient of a revelation. Mohammed's revelation, the Koran, is the only one not to be abrogated. It is distinctly the Word of God as revealed to Mohammed, and is on a higher plane than the Traditions, or inspired sayings of the prophet. It was inscribed on tablets in heaven from eternity. From time to time portions of it were given to Mohammed by the angel Gabriel.

The Moslem must believe, furthermore, in angels, of whom there are great numbers. They were created long before the world was, and are of a finer material. Every believer has two recording angels; one for his good, the other for his bad deeds. The angels are charged with intercession for mankind. Certain angels preside over hell. Two important angels are Munkar and Nakir; in these every Moslem believes most firmly. There are four archangels: Gabriel, the angel of Revelation; Michael, the patron of the Israelites; Izrafel, who, on the last day, will blow the trumpet, and Azrael, the angel of death. Besides these angels there are the ginn, good and bad spirits, in whom Mohammed believed. Sura 72 states that a band of them once passed Mohammed and paused to listen to him. What they heard caused them to exclaim: "verily, we have heard a marvelous discourse." Some of them are believers in Islam and perform all the duties that devolve upon the true believer. They may assume various forms, and are so numerous that the pious Moslem, in performing the most trivial act, such as building a fire, is apt to exclaim "with your permission, ye blessed." By many it is believed that all ginn are to be destroyed on the last day; others believe there is to be a special place, outside of paradise, where such as have been believers may dwell.

In the immortality of the soul, resurrection, judgment, paradise, and hell, the Moslem believes most firmly. During the first night after death, the soul remains with the body, so that it may be questioned by the two angels Munkar and Nakir. It is a question as to whether the Koran refers to this belief or not; but nevertheless it is fixed in Islam. When the angels have finished their examination, they depart, leaving the believer in peace; the wicked in torment. This is the Moslem Hades. In sura 23, v. 99, speaking of unbelievers who have died, it is said: "behind them shall be a bar until the day of resurrection." The word translated by Sale "bar" is the Arabic *barzach*, and is explained by the native commentators as a partition between the living and the day of judgment, or as an intervening state between death and judgment. Generally speaking, it denotes the state of the departed soul, and must be entered by all. When the trumpet is blown on the last day all must appear. Mention of this day is very often made in the Koran, especially in the earlier suras. It is the one subject of suras 75, 81, 82, 83 and 84. On this day all actions shall be weighed. "Those whose balances shall be heavy with good works shall be happy; but those whose balances shall be light are those who shall lose their souls and shall remain in hell forever." (Sura 23, v. 104.) This great day, the coming of which is known to God alone, is to be ushered in by certain signs, divided into the "lesser" and the "greater." Of the former there are eight, such as decay of faith, turmoils, wars, etc.; of the latter there are 16, the sun will rise in the west; the Antichrist will appear; Jesus is to come to earth, embrace Islam and slay the Antichrist. The last trial of this day is to be the crossing of the bridge Sirat, which is finer than a hair and sharper than a sword. Still, the believer shall cross in safety while the wicked fall to the gulf below. Should any who have professed Islam, yet lived wicked lives, be consigned to hell, they are not to remain there forever; but will be gradually purified and released. To the Moslem, hell is for the followers of other religions.

In paradise the Moslem is to enjoy all those things which to the mind of the desert Arab seemed most desirable. Here are gardens, trees ever green, rivers ever flowing, beautiful maidens, appetites that, so far from being satiated, increase as the delights are enjoyed. Here, too, he shall always see the face of (his) God and praise him, to whose mercy he owes his bliss; for his works alone are not enough to assure him entrance.

Islam is not, however, a religion of faith only; for there are certain institutions, constituting Din, or religious practice, the performance of which is obligatory. Prayer, almsgiving, fasting, and the pilgrimage, are duties that tax the Moslem to no small degree. Prayers are to be made to God five times every day, and are to be made with the utmost decorum. Preparatory to these prayers there are certain ceremonies of purification, consisting of ablution, either partial or covering the entire body;

for the idea of an unclean person in the presence of God is intolerable to the Moslem. To facilitate these ablutions, every mosque is provided with a tank, whence issue many small streams of water. Should the worshipper be praying where there is no water, he may use sand or dust. As he ends this ceremony he is to testify that "There is no god but Allah, and Mohammed is his envoy," following this by reciting sura 97. Should the worshipper be conscious that he is clean, he may omit the ceremony. He then assumes a certain position, facing Mecca, and states softly that he intends to perform so many inclinations, following this by reciting the first sura. After this other expressions of praise are used. Though prayer is frequently mentioned in the Koran, the five periods at which it is enjoined are nowhere mentioned together. These periods are morning, noon, afternoon, sunset, and night. The approach of these hours is heralded by the muezzin, who, ascending the minaret of the mosque, cries out: "Allah is most great (four times); I testify that there is no god but Allah (twice); I testify that Mohammed is the envoy of Allah (twice); come to prayer (twice); come to security (twice); Allah is most great (twice); there is no god but Allah." Prayers may be said wherever the believer happens to be at the time; but on Friday they should be said at the mosque, where a sermon is also delivered.

Almsgiving is a very important duty in Islam and grew doubtlessly out of the natural hospitality of the Arabs. The Koran makes frequent mention of it, enjoining it in most emphatic terms. "O true believers, bestow alms of the good things which ye have gained, and of that which we have produced for you out of the earth, and choose not the bad thereof to give it in alms, such as ye would not accept yourself." (Sura 2, v. 269.) "If ye make your alms to appear, it is well; but if ye conceal them and give them unto the poor, this will be better for you, and will atone for your sins." (Ibid. 272.) How Mohammed considered alms may be seen from several passages of the Traditions, as quoted by Hughes. "Your smiling in your brother's face is alms; assisting the blind is alms." The Koran distinguishes between legal and voluntary alms; but this distinction has been done away with to a great extent. The necessity of giving, however, remains and alms are given regularly by those who neglect many of the other duties. In the early days of Islam legal alms were collected by officials appointed for that purpose; but their bestowal now is left to the individual conscience.

Fasting was considered of great importance by Mohammed, as thereby atonement might be made, and at the present day many who neglect their daily prayers perform all the duties of the fast. The month of Ramadan was chosen for the great fast, because in it revelation came to Mohammed. Throughout this month, during the entire day, drinking, eating, smoking, and many other indulgences are forbidden. When night comes, however, restrictions are removed till the next day. This fast is very severe when it falls in summer (the year being lunar, each month passes through all the seasons) and many exemptions are provided for those unable to undertake its arduous duties. Other fasts, meritorious, but not obligatory, are also in favor with Moslems. The object of these fasts is not altogether concerned with the mortification of the body; the heart is to fast; it must abstain from worldly matters and commune with God.

Once at least in his life-time the Moslem must make the pilgrimage to Mecca. "We appointed the holy house of Mecca to be a place of resort for mankind, and a place of security; and said, Take the station of Abraham for a place of prayer; and we covenanted with Abraham and Ismael, that they should cleanse my house for those who should compass it, . . . and those who should bow down and worship there." (Sura 2, v. 119.) "And it is a duty toward God, incumbent on those who are able to go thither, to visit this house." (Sura 3, v. 91.) Some further regulations are found in sura 2, v. 194, and in sura 22. Trade may be indulged in while on the pilgrimage, and sura 5, v. 2, gives direction for women who contemplate the performance of this duty. When the pilgrim nears Mecca he bathes and puts on the Ihram, pilgrim's robe, and advances to the city. Here there are certain ablutions to be performed before kissing the Black Stone. He must then encircle the Caaba, the temple, seven times; kissing the Black Stone each time. After other prayers and ceremonies he must run between Mount Al-Safa and Mount Al-Marwa seven times, with stated prayers. Later he must visit the Valley of Mina and Mount Arafat where more prayers are performed. On the 10th day he proceeds to Mina and casts stones at three pillars which are set up there, seven stones at each. After this very ancient custom there is a sacrifice which ends the pilgrimage. The pilgrim may then be shaved and resume his usual clothing. He should, however, visit Medina and do homage at the tomb of Mohammed.

Though not reckoned as one of the pillars of Islam, still the obligation to wage holy wars has been so firmly held that it deserves mention here. In early days every Moslem looked forward to a world-wide conquest, and by means of these holy wars expected to bring all countries under the banners of Islam. To a conquered country the terms were: Embrace Islam, pay tribute, or die. These were harsh terms, but much of their severity is accounted for by the early history of Islam. Broken oaths of allegiance and unprovoked attacks are responsible, to a large extent, for Mohammed's uncompromising attitude. The Koran does state itself clearly on this point, yet no precept found there, when "taken with its context, can justify unprovoked war." At the present day a far more liberal policy is preached toward unbelievers, and the subject is much debated by the learned in Islam. It may be said that the day of these wars "is rapidly passing away, if, indeed, it be not already passed."

Among the prohibitions of the Koran, the most important are those concerning wine and gambling. "They will ask thee concerning wine and lots; answer in both there is great sin and also some things of use unto men; but their sinfulness is greater than their use," and suras 2, v. 216; 5, v. 92, treat of the same. These verses are held by the Moslem to be an absolute prohibition. There might be, however, some doubt as to that if the verses alone, and not their traditional interpretation, were considered. Another prohibition of the Koran is murder. When one believer kills another intentionally he is to remain in hell forever. (Sura 4, v. 96.) From this fate, however, popular belief rescues him. Should the killing be by accident, there are certain expiations that may be made. There are also many prohibitions in regard to eating, the most important of which is that in regard to swine-flesh. (Sura 5, v. 4.) Such flesh as is eaten must be from an animal killed in a prescribed manner. Laws of marriage, divorce, testaments, and many other civil and criminal laws are founded on the Koran and the Traditions. Mohammed founded not only a religion but a social system as well, wherein the religious and the political life are inseparable. This is the unique feature of Islam.

Mohammed is said to have told his followers that after him 73 sects would arise. His prophecy has been more than fulfilled. It is impossible to give more than a synopsis of a few of the more important divisions of Islam. The two great divisions of sectarian Islam are the Sunnites and the Shiites. Compared with the Sunnite, the Shiite is a small sect, numbering about 15,000,000, while the former has about 145,000,000 adherents. The Shiites believe Ali to have been the legitimate Caliph or Imam, that is, successor of Mohammed, and consequently reject Abu-Bekr, Omar and Othman. Ali, by his double relationship with the Prophet — he was cousin and son-in-law, — as well as by reasons deduced from the Koran, and by traditions assigning him the appointment at the hands of Mohammed himself, should have been Imam. When Omar died, Ali was offered the succession, but as he could not satisfy his opponents that he would rule in accord with their wish he did not receive it till the death of Othman. Ali, however, was soon murdered and his son Hasan abdicated in favor of Muawiyah on condition that he might resume his office at Muawiyah's death. Yazid, however, cheated Hasan of his rights and here starts the Shiite schism. They profess allegiance to a line of 12 Imams, beginning with Ali and ending with Al Mahdi, who disappeared, but is to return. In the meantime they receive religious and legal decisions from a class of learned men, called Mudgtahids, a class of authorities not recognized by the Sunnites except in the case of the founders of the four orthodox Sunnite schools. There are numerous subdivisions of the Shiites, but on certain points they agree. Most of them agree in believing the Imams to be of divine nature; the result probably of a tradition credited to the Prophet, wherein he stated that he and Ali were pre-existent, before even the world was formed. The Shiites also observe the ceremonies of Moharram in commemoration of Hasan and Hosein, who were sons of Ali and were both murdered. Their memories are sacred to the Shiites. They differ from the Sunnites in that they credit the fire worshippers with the possession of an inspired book or revelation. In the ritual and civil laws also many differences are found. They have a large collection of traditions, a fact often ignored by scholars, misled by the Sunnites' claim to be the Traditionists *par excellence.*

The Sunnites acknowledge the first four caliphs to have been the rightful successors of Mohammed. They are divided into four orthodox sects or legal schools, the first of which was founded by Abu Hanifa. This Abu Hanifa was a pupil of the sixth Imam of the Shiites; but separated from him to form the school of his name that now predominates in Turkey, Central Asia, and northern India. The second of these schools, that of Ash Shafia, prevails in southern India and Egypt. The third school, that of Malik, has its home in Morocco and Barbary. The last school, that of Ahmed ibn-Hanbal, is found in East Arabia and portions of Africa. The term *Sunni,* which they apply to themselves, is an arrogant title. It signifies «one who is on the path.» They claim that they receive the six authentic books of tradition. The main points wherein they differ from the Shiites have already been touched upon; the great body of ritualistic differences must be passed over.

From the school of Ahmed ibn-Hanbal sprang the sect of the Wahhabites, who are named after their founder's father, the founder himself being named Mohammed. This Mohammed, born in Arabia, in the early part of the 18th century, having seen, in the course of his travels, that Islam had departed from its primitive faith, was filled with determination to restore to the religion of Mohammed its early purity. His zeal as a reformer received some temporary setback and he soon became the warrior-prophet. Many converts were made by his missionaries, and the movement grew till Turkey feared for her own safety. In 1803 Mecca, and a year later Medina, was captured. The political power of the Wahhabites was soon destroyed, however, though the principles are still a force in Islam. In India, too, the movement met with a similar fate.

The tenets of the Wahhabites are, practically, those held by the early Moslem. They arrogated to themselves the name of Unitarians, stigmatizing other Moslems as polytheists, inasmuch as the doctrine of the eternity of the Koran meant two eternal beings, therefore two gods. The reverence paid to saints and their tombs aroused to a high degree the antagonism of the Wahhabites. Even the tomb of Mohammed receives no reverence from them, and when they captured Medina, all the rich ornaments were stripped from this sacred spot.

Early in the history of Islam there arose a set of free-thinkers, whose theories are held at the present day. They are known as the Mutazalites and were founded by a Persian, Wasil ibn-Ata, who separated from the school of Hasan al-Basri. The Mutazalites hold that man is the governing factor in his own acts, and is perfectly free to choose; predestination being thus abolished from their tenets. They deny the eternity of the Koran, as well as the attributes of God, believing that each attribute would be a separate, eternal quality, and that, therefore, the unity of God would be destroyed.

Mokanna, «the veiled,» is an interesting figure in the history of Islam, owing to his appearance in Moore's 'Lalla Rookh.' This fanatic proclaimed himself God incarnate, and taught that religion consisted in faith, not works. He sent out many missionaries and quite a force collected under his banners. At the advent, however, of the caliph's forces, which were sent to crush him, he deserted his followers and finally committed suicide to escape capture. Persian and Indian sources are responsible for many of his doctrines. He had secret followers for many centuries after his death.

Hasan ibn-Sabah, founder of the order of the Assassins, is a figure well known in history, owing to his connection with the Crusaders. He was at first an adherent of another sect and taught the doctrines of that sect throughout Arabia and Persia; but having won the confidence of a powerful prince, he gained possession of a fortress in Persia. Here he constituted himself grand-master of an order with a large number of minor officials, repudiated many of the tenets of the sect to which he belonged, and began to preach religious devotion and political assassinations. His followers were many throughout Syria and Persia, and he soon announced himself as al-Mahdi, repudiated the Koran, and with it all moral laws. Under the title “Old Man of the Mountain,” he became a terror not only to the Crusader, but to the Turk as well. They were finally overthrown. “Of these sects there are still scattered remnants in Syria and India, and as late as 1866 an English judge at Bombay had to decide a case of disputed succession according to the law of the Assassins.”

There is a sect of Mystics in Islam known as the Sufis. They are Moslem in name only, for they deny the necessity of religion, though they admit that its practice is useful as a guide. Their chief doctrine is entirely pantheistic. God is all and is in all, consequently there is no good, no evil, only God. The only occupation of the Sufi is meditation, constant meditation; for by this he is made ready to return to God when his soul is released from captivity. They are divided into numerous sects, some of them believing themselves simply inspired of God, others believing themselves unified with God. Their belief, they claim, has always been professed. It obtained its chief hold in Persia, where it has stirred up much trouble. Though banished in 1797, “the whole country has been so undermined by this insidious heresy that it can almost be said that Persia, throughout its whole extent, contains no real Moslem.”

A few words may be added in regard to Islam's hope of a Messiah, Al-Mahdi, “the guided one.” He is to come to restore the glory and power of Islam, and has been foretold by Mohammed, in many traditions. According to the Sunnites, he is still to come; but the Shiites believe he has already appeared in the person of the twelfth Imam, who having disappeared for a time, is to return. Many have taken advantage of Islam's hope and have announced themselves as the promised Mahdi. The one, to whom at present the eyes of the world are turned, is the head of the brotherhood of as-Sanusi, founded by Mohammed ibn-Ali, as Sanusi, in 1837. This brotherhood advocates reforms of the most sweeping character. The exact letter of the Koran is to be followed in all matters. It is, generally speaking, closely related to the Wahhabi movement, yet stricter. The present head, who claims to be the Mahdi, has established himself in the Sahara, and from here he sends out his missionaries. He is collecting arms and quietly making preparations for a holy war that is to transform Islam. “Sooner or later Europe — in the first instance England in Egypt and France in Algeria — will have to face the bursting of this storm. For this Mahdi is different from him of Khartum and the southern Sudan, in that he knows how to rule and wait. . . . It will then be for the Ottoman sultan of the time to show what he and his caliphate are worth. He will have to decide whether he will throw in his lot with a Mahdi of the old Islam and the dream of a Moslem millennium, or boldly turn to new things and carry the successorship and the people of Mohammed to join the civilized world.”

In bringing this article to a close, mention must be made of Babism, of which Behaism is the latest development. In the year 1844, Ali Mohammed, in Persia, announced himself as the *Bab*, or “gate,” that is, “the source through which revelation comes.” As the inaugurator of a new dispensation, he set about the reformation of men's lives. Many converts were made and the antagonism of their Moslem neighbors was aroused. Thousands of adherents to the new faith were slain, and in 1850 the Bab himself met this fate. As persecution continued many fled from Persia and finally settled at Akka. In this band of exiles was one upon whom the Bab had conferred the title of Beha Allah, that is, “the Glory of God.” His declaration that he was the manifestation foretold by the Bab was accepted, and his followers have been styled Beha'is. At his death in 1892, his son, Abbas Effendi, succeeded him and is considered as the third of the divine messengers. The thousands of converts made by this new movement attest its importance. Its missionaries have made converts by thousands. Here, in the United States, its adherents are scattered throughout the larger cities, and Professor Browne, the eminent English authority on Babism, speaking of its influence, states that “the number and influence of the Babis in Persia is immensely greater than it was 15 years ago, and the conviction which I heard continually expressed this year in Babi circles in Cairo, that in the course of a very short time their religion would reign paramount in their own country, ... is seriously discussed by European diplomatists and consular officers.”

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Mohave (mō-hä'vä) **Desert**, California, an arid basin chiefly in San Bernardino County, in the southeast, and also extending into Arizona, and forming part of the great Colorado Desert. The Mohave River rising in the San Bernardino Mountains flows through it for some distance, until it disappears in the Mohave Sink.

Mohave Indians, an American tribe of the Yuma family, residing in Arizona and California in the region of the Colorado River. There are upward of 2,000 Mohaves remaining, 600 of whom live on the Colorado River Reservation in Arizona. They are an agricultural people, rank high physically, and are expert makers of pottery and baskets. They practise tattooing and cremate their dead.

Mohawk, a river whose head-waters are in the southern part of Lewis County in New York, which flows south to Rome, then east by south, with many curves, to the Hudson River, which it enters at Cohoes. It is about 150 miles long, and is the largest tributary of the Hudson. In several places along the route there are rapids and falls, as at Little Falls in Herkimer County, Oriskany in Oneida County, and several other places, all of which are noted for manufacturing. The bed of this stream was once much wider than the present channel through which the water passes; in some places the distances between the old banks are from a mile to nearly three miles. The Mohawk Valley is noted for its beauty and the fertility of its soil. The Erie Canal (q.v.) is parallel with the river to Rome. A number of pretty villages and thriving manufacturing towns are on its banks, chief of which from west to east are Rome and Utica in Oneida County; Ilion, Herkimer, and Little Falls in Herkimer County; Fort Plain, Canajoharie, Fonda, and Amsterdam in Montgomery County; Schenectady in Schenectady County, and Mechanicsville in Saratoga County. In the «Settlement Period» of the United States, this valley was the main highway from the «East Colonies» to the Great Lakes. It was the home of the most warlike tribes of Indians, the headquarters of the Five Nations.

The first missionaries and the first explorers who left the Hudson River in this part of the United States, journeyed along the country through which flowed the Mohawk.

In this valley, near the Mohawk, Goupil was killed by the Indians, and later Father Jouques (q.v.) was martyred at the place now called Auriesville, on the south side of the river a little east of Fonda. Sir William Johnson built two homes in this valley, one at Fort Johnson about one mile west of Amsterdam, now the railroad station of Akin, the other, Johnson Hall, near the present Johnstown in Fulton County. Much of the early history of the river and valley as related to the whites is connected with the rule of Sir William Johnson and his power over the Five Nations. The centre of wealth and power, in the valley before the war, was at Johnson's home. At the breaking out of the Revolutionary War, an effort was made by both parties to hold possession of the Mohawk. The death of Sir William Johnson, just at the beginning of the War, removed a strong power from the council. His sons and their friends lacked his humanity and wisdom. The union between the British and the Indians resulted in many terrible scenes, among others the massacres of Cherry Creek and Schoharie, the burning of homes, and the taking of many lives in the valley. Burgoyne (q.v.) realized the value of having possession of this valley, and some of the important battles of the Revolution took place along the Mohawk. There were many Tories in the valley; but a large number of the settlers were always patriots. When the news of Concord and Lexington reached the inhabitants along the Mohawk, many of them loaded into wagons all the grain they could spare and sent the precious cargoes over the rough roads to Boston. When the British determined to end the war the Mohawk Valley, the gateway to the West, was the site chosen. Here the Tories outnumbered the patriots, and the Indians were the allies of the British; but St. Leger's defeat at Oriskany by men under Nicholas Herkimer, filled Burgoyne with despair and fired the enthusiasm and enlivened the hope of the patriots.

Two railroads parallel the river to Rome, the New York Central and Hudson River and the West Shore. The manufacturing industries of the valley which depend largely for motive power upon the water-power of the Mohawk, are extensive and increasing.

Mohawks, a tribe of North American Indians, one of the Six Nations, named collectively by the French the Iroquois. According to their own tradition, confirmed by those of other tribes, they were the eldest people in the confederacy of the Six Nations. They believed that they were liberated from subterranean confinement by Tareya-wagon, who guided them into the valley of the Mohawk; thence they passed to the Hudson and to the sea; but the valley in which they at first established themselves was the seat of their power from the discovery of the country until the American Revolution. Their dominion extended from Lake Champlain to the head-waters of the Susquehanna and the Delaware. Renowned above all the other nations for their skill as warriors, they carried terror wherever they went. Their forays were pursued as far as the Connecticut River, and their influence prevailed among the small independent tribes about the region of the present city of New York. During the French and Indian war they supported Sir William Johnson, following him in his most perilous expeditions, and aiding him in the contests of Lake George and Niagara. After his death they transferred their attachment to his family, and were forced to flee from their ancestral home to Canada, where lands were assigned them on the Grand River. See IROQUOIS; SIX NATIONS.

Mohegan, mō-hē'gan, or **Monhegan** (mŏn-hē'gan) **Indians**, a tribe of North American Indians of the Algonquian family, who formerly lived on the Thames River in Eastern Connecticut. They were at one time united with the Pequots and after the death of Sassacus, the Pequot leader, the remainder of the tribe came to the camp of the Mohegan chief. After the death of King Philip in 1676, the Mohegan tribe was the only important one in that region. They became scattered, some joining the Brotherton Indians in New York. The survivors of this race are so mixed with negro and white blood that they have practically lost their identity.

Mohilev, mō-hē-lĕf', Russia, a western town and government. The town and capital of the government is on both banks of the Dnieper, 85 miles southwest of Smolensk. The town has spacious streets and a large octagonal square occupied by the principal buildings, among others the palace of the Greek archbishop and the bazaar. It is surrounded by ramparts and is fortified by a citadel on a commanding height.

The staple manufacture is tobacco; and the trade with Riga, Memel, Dantzic, and Odessa, chiefly in leather, wax, honey, potash, oil, and grain, is very extensive. Pop. about 45,000, many being Jews. The government, bounded north by Vitebsk, east by Smolensk, southeast by Orel, south by Czernigov, and west by Minsk, is about 210 miles long from north to south by 112 miles broad, and has an area of about 18,545 square miles. The surface, though in the line of watershed which divides Europe into two great basins, is generally flat, and sends its waters chiefly to the South Dwina, but partly also to the Dnieper. The soil is fertile, though very imperfectly cultivated, and the forests, chiefly of oak and fir, cover extensive tracts. The principal mineral is bog iron ore. Both trade and manufactures are limited.

Another Mohilev in the government of Podolsk, on the left bank of the Dniester, 60 miles east-southeast of Kamenetz, has a population of about 25,000.

Mohldenke, mōl'dĕn-kė, **Charles Edward,** American Egyptologist: b. Lyck, East Prussia, 10 Oct. 1860. He was graduated from Columbia in 1879, and from the University of Strasburg in 1884. He has published: ‘The Egyptian Origin of Our Alphabet’ (1886); ‘The Trees of Ancient Egypt’ (1886); ‘The New York Obelisk’ (1891); ‘The Tale of the Two Brothers’ (1898); ‘Egyptian Classics’ (1900).

Möhler, mē'lĕr, **Johann Adam,** German Roman Catholic theologian: b. Igersheim, Würtemberg, 6 May 1796; d. Munich 12 April 1838. He studied theology at Tübingen, became professor there in 1822, and in 1835 was called to a chair in Munich. He was an able doctrinal disputant and did much to arouse the German Roman Catholic Church to new vigor. He wrote ‘Unity of the Church’ (1825); ‘Athanasius the Great’ (1827); ‘Symbolism, or Exposition of the Doctrinal Differences between Protestants and Catholics’ (1832; English version by Robertson), and, a reply to the works of Baur and others against his ‘Symbolism,’ in 1834 ‘New Investigations on the Doctrinal Differences between Catholics and Protestants.’ He was one of the great theologians of the century. Consult the biographies in German by Friedrich (1894) and Knöpfler (1896).

Mohocks, mō-hŏks, **The,** a club in London, England, also known as the Mohawk Club, which had a scandalous existence in 1711–12. «The avowed design of their institution was mischief.» Gay mentions in ‘Trivia,’ that the Mohawks rolled women in hogsheads down Snowhill, and Swift told Stella of a report that 80 of them had been put into prison; while Lady Wentworth, writing to her son Lord Strafford, says, «I am very much frightened with the fyer, but much more with a gang of devils that call themselves Mohocks.» A royal proclamation was issued against them 18 March 1712.

Mohr, mōr, **Charles Theodor,** American botanist: b. Esslingen, Germany, 28 Dec. 1824; d. Asheville, N. C., 1901. He was educated at the Polytechnic School in Stuttgart and in 1845 made a trip to Dutch Guiana in the interest of botany. He removed to the United States in 1848 and in the following year went to California where his health soon became impaired and he returned to the east engaging in the drug business in Louisville, Ky., and later in Mobile, Ala. He was employed in various botanical and forestry investigations under the State and United States governments. In 1884 he was appointed botanist of the Alabama Geological Survey and in 1889 became agent of the forestry division of the United States Department of Agriculture. He published: ‘The Timber Pines of Southern United States’ (1896–7); ‘Notes on the Red Cedar’; ‘Plant Life of Alabama’.

Mohr, one of the larger of the West African gazelles (*Gazella mohr*), notable especially as the source of the «mohr-stones,» or bezoars, derived from these animals and highly esteemed by the Arabs of Morocco and Algeria.

Mohs, Friedrich, frēd'rĭʜ mōs, German mineralogist: b. Gernrode 1774; d. Agordo, Lombardy, 29 Sept. 1839. He studied at Halle and the mining academy at Freiberg, in 1811 became professor of mineralogy at Grätz, and later held similar posts at Freiberg and Vienna. He is known as the inventor of a new system of classification for minerals, which regards, in the collecting of species into higher groups, only their external characteristics. He published: ‘Die Charaktere der Klassen, Ordnungen, Geschlechter und Arten oder Charakteristik des naturhistorischen Mineralsystems’ (1820); ‘Grundriss der Mineralogie’ (1822–4, in English 1825); etc.

Moidore, moi'dōr (from the Portuguese, *mœda d'ouro,* literally, coin of gold), a gold coin formerly used in Portugal (from 1690–1722), worth about $5.

Moire, mwär, a French name for watered silks. Though made in the same way as ordinary silks, these are of double width, and must be of a stout substantial make. They should also be folded in such a way that the air contained between the folds should not be able to escape easily. They are subjected to an enormous pressure, of from 60 to 100 tons, generally in a hydraulic machine, and the air, in trying to escape, drives before it the small quantity of moisture that is used, and hence is effected the permanent marking called watering, which is for the most part in curious waved lines. The finest kinds of watered silks are known as *moires antiques.* Woolen fabrics to which the same process has been applied are called *moreen.*

Moise, Edwin Warren, American lawyer and soldier: b. in Charleston, S. C., 21 May 1832; d. Sumter, S. C., 8 Dec. 1902. At 15 he left school and after working in a wholesale grocery, studied law. In 1856 he opened a law office. Although opposed to secession, being a Douglas Democrat, and taking the stump against the movement, at the outbreak of the Civil War he organized a company at his own expense, and became its captain. In 1863 he was made major of the 7th Confederate cavalry, and near the close of the War was appointed colonel. He was in the army of Northern Virginia under General Lee, participating in every prominent battle. After the war he settled in Sumter and became a successful lawyer. In 1876 he was elected adjutant and inspector-general on Wade Hampton's ticket, and re-elected in 1878. In 1885 he was presidential elector.

Moise, Penina, American poet: b. Charleston, S. C., 23 April 1797; d. Charleston 13 Sept. 1880. A personality of much charm, whose character is still held in loving memory by all who knew her. Her poetical gifts were early evidenced and her contributions to the press of her day were many. Her hymn book, written for the Charleston Beth Elohin Congregation, is still utilized, and was a pioneer in its field. Despite her blindness in her later years, she continued to write poems, and her home was a place of pilgrimage to a host of admirers.

Moissan, Henri, French chemist: b. Paris 28 Sept. 1852; d. 20 Feb. 1907. He was educated at the Museum of Natural History in Paris, and at the School of Pharmacy; taught in the Higher School of Pharmacy 1879–83, and then (1886) became its professor of toxicology. He isolated and liquefied fluorine, thus winning in 1887 the Lacaze prize from the Academy of Sciences; was transferred to the chair of mineral chemistry in the School of Pharmacy in 1889; and there won great fame by his important experiments and achievements with the electric furnace. In 1892 he made the manufacture of acetylene simple and commercially profitable by his discovery that if carbon and lime be fused in the electric furnace pure calcium will be formed, which makes the liberation of acetylene an easy matter. Much more spectacular was his formation of diamonds in 1893; iron was melted in the electric furnace and saturated with carbon; the furnace at a temperature of more than 4000°C. (that is, more than 7200° F.) was plunged into cold water; the resulting ingot was attacked with hot aqua regia; the iron was thus dissolved and diamonds were disclosed. In 1906 he received the Nobel prize in chemistry. Moissan wrote ‘L'Isolement de Fluor’ (1886); ‘Réproduction du Diamant’ (1893); ‘Etude complète des Carbones amorphes et des Graphites’ (1898).

Moisture. See Rainfall.

Mokaddasi, mŏk'ạ-dā-sē, Arabian geographer: b. Jerusalem 946. His name is derived from his birth-place and signifies merely “of Jerusalem.” He was well educated and after a pilgrimage to Mecca in 965, devoted himself to travel. His critical sense makes his work the most trustworthy by any Mohammedan geographer. Two editions of it were published in his life-time; it was edited by De Goeje in 1877; and the part relating to Syria and Palestine appeared in an English version by Le Strange in 1886. Consult Le Strange, ‘Palestine Under the Moslems’ (1890).

Mokanna, mō-kăn'nạ, **Al** (Hakim-ben-Allah), styled the “Veiled Prophet,” Mohammedan impostor of the 8th century. He hid his face under a veil, a proceeding which his followers ascribed to the splendor of his countenance. He attributed to himself divine powers, and is said, by means of his chemical and other knowledge, to have performed apparent wonders. He gained many followers, so that at last the Caliph Mahdi was compelled to send an armed force against him. He retired to a fortress in Transoxiana, where he first poisoned his soldiers, and then burned himself. His followers continued to pay him divine honors after his death. He is the hero of Moore's ‘Veiled Prophet of Khorassan’ in the first part of ‘Lalla Rookh’ (1817).

Moki, mō'kē, or **Hopi,** a Pueblo tribe of Shoshonean Indians inhabiting north central Arizona. They are mesa-dwellers, their seven villages, chief of which are Walpi and Oraibi, being situated upon three mesas difficult of access, several hundreds of feet above the desert lands around. The inhabitants of the small village of Hano are of Tanoan stock, and speak a different language, being descendants of refugees from the Rio Grande who migrated in 1680 at the time of the Pueblo rebellion. The Moki are of an industrious and provident nature, successful cultivators, keeping their granaries always well stocked with agricultural produce; they are also noted for their manufactures of pottery, baskets, and blankets, and for their wood-carving. They number about 1,500 and are descendants of tribes who according to the evidence of the ruins scattered around have inhabited the region for several generations. Their traditional ceremonials include the now widely-known “snake dance,” which is performed with live rattlesnakes carried in the mouth, the “winter solstice,” and the “new fire.”

Mola, Pietro Francesco, Italian painter: b. Coldre, near Como, 1612; d. Rome 13 May 1666. At an early age he went to Rome, where he studied painting under Prospero d'Orsi and Giuseppe Cavaliere d'Arpino. He afterward painted at Venice, Milan, and Bologna, in which last city he adopted the style of the local painters, especially Albani. His landscapes are of special excellence. The English National Gallery possesses his ‘St. John Preaching in the Wilderness,’ and ‘The Repose of the Holy Family in the Flight into Egypt.’ In the Ravenna chapel of the Church of Jesus at Rome is his ‘Peter in Prison’ and in fresco ‘The Return of Peter to Rome.’ He also painted the ‘History of Joseph’ in the Quirinal Palace. Others of his works are to be seen in the Louvre, the Pinakothek at Munich, and the Dresden Gallery. He was one of the followers of Annibale Caracci, whose manner he reproduced with ease and dexterity, but he was lacking in imaginative depth, while his indebtedness to Albani and Guercino is too evident.

Molasses. See Sugar.

Molay, Jacques Bernard de, zhäk bār-nār de mō-lā, French knight-templar, last master of that Order: b. Burgundy about 1243; d. Paris 11 March 1314. He entered the Order of the Templars in 1265, and became its grand master in 1298. In 1306, while he was in Cyprus busied about raising new troops against the Saracens, he was summoned to France by Pope Clement V. Philip the Fair, fearing, it is alleged, the power of the Order in France, seized Molay and all the knights then resident in France, after receiving them with the greatest kindness; charged the Order with heresy, tried them before a packed court; and found them guilty. Molay was imprisoned and terribly ill-used for more than five years, and then was burned at the stake. The guilt of the Templars is still a disputed historical question. Consult Prutz, ‘Entwicklung und Untergang des Tempelherrenordens’ (1888).

Moldau, mŏl'dow, a river of Bohemia, which rises in the Schwarzberg, on the frontiers of Bavaria, flows first southeast to Rosenburg, where it turns almost due north, and continuing that direction, in a circuitous course, passes

Budweis. After receiving several tributaries, it traverses the town of Prague, and after turning due east, joins the Elbe on the left, 17 miles north of Prague. Its whole course is about 230 miles. It begins to be navigable at Rosenburg, where its north course commences, but at first only for shallow barges. Below Prague it floats vessels of 60 tons. It abounds with fish.

Moldavia, mŏl-dā'vĭ-a, Rumania, a northern division of the kingdom since 1861, when the union of the former principalities of Wallachia and Moldavia as the Principality of Rumania was proclaimed. See RUMANIA.

Mol'ding, or **Moulding,** (1) in carpentry, a method of ornamentation by grooved or swelling bands, or forms following the line of the object. There are numerous varieties, as the bead, the astragal, the cavetto, the echinus, the fillet, the fascia, the ovolo, the ogee, the cyma, the recta or reversa, the quirk, the bolection, etc. (2) In mining, the ore found on the top of veins near the surface of the ground. (3) In shipbuilding, giving the correct outline and depth to ship's timbers, etc.; it is one part of the operation of forming. (4) In architecture, a term applied to all the varieties of outline or contour given to the angles of the various subordinate parts and features of buildings, whether projections or cavities, such as cornices, capitals, bases, door or window jambs and heads, etc. There are eight sorts of regular moldings: namely, the ovolo, the talon, the cyma, the cavetto, the torus, the astragal, the scotia and the fillet. See also ARCHITECTURE.

Molé, Louis Matthieu, loo-ē măt-tē-ĕ mō-lā, French statesman: b. Paris 1584; d. there 3 Jan. 1656. His integrity and fearlessness often resisted the arbitrary measures of the despotic Richelieu; and under the no less ambitious but less vigorous Mazarin, he acquired the esteem of all parties. In 1641 he was appointed first president of the Parliament through the influence of Richelieu, whom he had opposed in the process against the Marshal de Marillac. The disturbances of the Fronde soon after commenced. In this contest of factions Molé defended with equal prudence and sagacity the interests of justice and freedom, as well as those of the court; and when Paris became the theatre of tumults, conducted himself with so much firmness and dignity that his bitterest enemies could not withhold from him their approbation; and even Condé and Cardinal De Retz were forced to esteem him, although his unshaken rectitude and devotion to the welfare of the nation and the safety of the throne frequently frustrated their designs. He was more than once threatened with personal violence by the furious partisans of the Fronde, whom he overawed by his inflexible dignity. In the memoirs of De Retz and other records of the time of the regency of Anne of Austria and Mazarin, Molé's happy influence in the troubled state is everywhere perceptible. His 'Memoirs,' bearing on the stirring events in which he acted so great a part, were published in 1855.

Mole, a small insectivorous mammal of the family *Talpidæ*. They are related to the still smaller shrews (*Soricidæ*), from which the typical species may be distinguished by having the external ears so short that they are completely concealed in the fur, the fore feet broad and shovel-like, the skull provided with an auditory bulla and a zygomatic arch, and numerous other characters. The moderate number of species, belonging to 11 genera, are found only in the temperate portions of the Northern hemisphere. Three species, the common mole (*Scalops aquaticus*), the hairy-tailed mole (*Parascalops breweri*) and the star-nosed mole (*Condylura cristata*) occur in the Eastern United States. A fourth genus (*Scapanus*), with six species, is confined to the Pacific coast. The second is the smallest and is also distinguished by its densely hairy tail and numerous teeth. It is not common and is found chiefly in mountains and about evergreen forests. The star-nosed mole is known at once by the rosette of fleshy processes on the snout, and its larger size; both it and the common mole are abundant in cultivated lands and pastures, the former preferring moist, the latter dry lands. Their habits differ only in details. Moles are eminently fossorial — a mode of life for which they are by structure peculiarly adapted. They construct underground nests lined with soft grasses, from which several passages run off in different directions, and by branching become finally divided into a network of burrows which daily enlarges as the animal searches for the earthworms and insects on which it almost exclusively feeds. They seldom come to the surface except just at noon — a habit which has been repeatedly observed but never explained. The young are born in the nest and some species raise two broods. Notwithstanding its scientific name the common mole shuns water while the star-nosed mole shows a decided predilection for its vicinity and is an expert swimmer. Consult Stone and Cram, 'American Animals' (1903).

Mole, a long pier or breakwater built of masonry and extending into the sea, at times to a distance of a mile or more. In San Francisco Bay are two of these piers, the Oakland Mole and Alameda Mole. The railroad extends to the end of these moles and connects with a line of ferry-boats.

Mole. See NÆVUS.

Mole Cricket. This insect is most appropriately named, for it combines the characteristics of the crickets (*Gryllidæ*), to whose family it belongs, with some of the habits and special adaptations of the moles. The mole-crickets dig winding burrows in the loose soil on the borders of ponds and ditches, raising ridges like miniature mole-hills. In their subterranean wanderings they cut the roots of plants, upon which, as well as upon earthworms and larvæ, they feed. A Porto Rican species (see CHANGA) does serious damage to crops. The European mole-cricket lays several hundred eggs in an underground chamber where they are guarded by the female, though many of the young are later devoured by the male. Probably ours have similar habits. The species occurring in the eastern United States are *Gryllotalpa borealis* and *G. longipennis*. They may be recognized by their large brown bodies with a velvet-like covering of fine, close hair, short wing covers, and fossorial front legs, not unlike the great paws of a mole.

Mo'lech. See MOLOCH.

Molecular Theory, in physics and chemistry, the theory which teaches that matter, however homogeneous it may appear to be, is in reality a heterogeneous aggregate of ultramicroscopic particles called "molecules." In a crude form this idea was entertained and defended, even before the Christian era, by certain of the philosophers of Greece and Rome, among whom Democritus and Lucretius may be especially mentioned. The writings of these ancient authorities are of great interest to the historian, and are highly creditable when allowance is made for the state of science at the time they were produced; but they are of necessity too general and too nebulous to be of practical value to the modern physicist, who demands that every theory shall be tested by a critical comparison of its necessary consequences with the facts of observation.

The molecular theory in its present form may be said to be a development of the 19th century; for although the celebrated Swiss mathematician Daniel Bernouilli had suggested, in the 17th century, that gases consist of little molecules moving freely about among themselves, and that gaseous pressure is due to the collisions of these molecules with the walls of the containing vessel, and although other thinkers had made analogous suggestions which helped to prepare the way for the modern theory, it was the work of John Dalton, in chemistry, which gave the first great impetus to the molecular theory, by making it, in some form or other, almost a necessity of thought. Dalton showed (1805) that when substances combine chemically, they do so in certain definite proportions; and he concluded that the facts of this sort which he amassed could be best explained by assuming that matter consists of exceedingly minute particles, or "atoms," each of which has a definite weight, and that when bodies combine chemically, their atoms come together in pairs, or in threes, or fours, or in some other manner, according to the compound formed. (See Atomic Theory.) It was shortly afterward observed that when gases combine, they do so in accordance with certain simple volumetric laws. One volume of hydrogen, for example, combines with one volume of chlorine, to form two volumes of hydrochloric acid gas; and two volumes of hydrogen combine with one volume of oxygen to form approximately two volumes of steam-gas. To bring facts of this sort into harmony with Dalton's theory, it was suggested by Avogadro in 1811, and independently by Ampère in 1813, that all gases, when under the same conditions of temperature and pressure, contain the same number of molecules per unit of volume. With these tangible evidences of the molecular structure of matter as an incentive, physicists and chemists set themselves the task of testing, in all conceivable ways, the consequences of such a theory; and in the course of a century of experimental and mathematical study, no fact has been discovered which tends to controvert the fundamental doctrine that matter has a molecular structure. The molecular theory, in some form, is therefore confidently believed to be true by practically all physicists and chemists. The observations which have been made, and which must be harmonized and explained by the molecular theory, are so numerous and so varied, however, that no single set of mutually consistent hypotheses about the nature of molecules has yet been proposed, which demonstrably explains everything that is known about matter. The chemist and the physicist have worked along lines that are widely different, the chemist investigating the phenomena that are observed when two or more definite substances combine so as to produce one or more new substances, while the physicist has confined his attention chiefly to the mechanical, thermal, electrical and magnetic phenomena that are observed in connection with definite substances whose chemical constitution remains unchanged. It is small cause for wonder (or for criticism), that identical conceptions of the structure of a molecule have not resulted from investigations of such a widely different character; and there is, thus far, no reason for doubting that the chemical and physical conceptions of a molecule will draw nearer together when further study has been given to solutions, to electrolysis, to the thermodynamics of chemical changes, and to other similar subjects whose discussion involves the consideration of changes which are partly chemical and partly physical. There is much evidence, already, to indicate that the "affinity" that chemical substances have for one another is of an electrical character; and when the physicist has arrived at a more definite knowledge of the ultimate nature of electricity, it is possible (and even probable) that this knowledge will go far to clear up the mysteries of chemical affinity, and consolidate chemistry and physics into a single science.

It has been abundantly proven that the "atom" of the chemist and the "molecule" of the physicist are (in general) different things; a molecule being a system formed by the union of a definite number of atoms, combined in a definite way. The molecules of a given substance are the smallest parts into which that substance can be conceived to be divided, without changing its chemical character; while the atoms are the proximate constituents through whose immediate combination the molecule is formed. (The word "proximate" is employed here, because the modern school of physicists to which Professor J. J. Thomson belongs have sought to show that the atoms are composed of still more minute bodies called "electrons," which may be regarded as the ultimate constituents both of the atom and of the molecule.) The molecules of most of the substances that are considered in inorganic chemistry are comparatively simple in structure. Hydrochloric acid gas, for example, is composed of molecules which each contain one atom of hydrogen combined with one atom of chlorine, as indicated by the formula HCl; and water (at least in the form of steam-gas) is composed of molecules which each contain one atom of oxygen combined with two atoms of hydrogen, as indicated by the formula H_2O. In organic chemistry molecules occur which apparently contain hundreds of constituent atoms, and the comparative stability of such systems is hard to understand, on any hypothesis. The chemical elements consist of molecules, just as compound bodies do; but in any given element the constituent atoms are believed to be all alike.

In the molecular theory as entertained by the physicist, the molecules of a body are commonly considered as small material systems which do not exert any chemical affinity for one another, but which may act upon one another by any of the so-called "physical forces," such as gravitation, electric and magnetic attraction and repulsion, and elastic pressure due to collision or impact. They are also considered, usually, to possess inertia, and to be subject, in general, to the same laws of motion as apply to the larger bodies of our familiar experience. (See MECHANICS.) In the "electron theory," to be subsequently mentioned, very different laws of motion are assumed; but the electron theory, although very promising, is not yet thoroughly tested, and is likely to be profoundly modified in many respects before it receives general acceptance, and hence the older doctrines with respect to molecules will be first considered, and the more important features of the newer and less developed theory will be given afterward.

One of the most fundamental assumptions of the molecular theory in its usual form is that the molecules of any one chemical substance are identically alike in all respects. This point was tested by Graham, in the case of hydrogen, by passing the gas through a series of porous partitions, and comparing the final hydrogen, as it issued from the last partition, with the original gas. No difference could be observed, and hence it was concluded that hydrogen, at least, is not a mixture of dissimilar particles; because it is known that a mixture of different gases, whose molecules are different in size, can be partially separated by a diffusion process of this kind. Stas, the great Belgian chemist, investigated this question by determining the atomic weight of a given element as prepared in different ways, and from different sources; and he found that the results obtained under these varying conditions were indistinguishable from one another, even when his work was so accurate that a variation in the atomic weight of the hundredth part of one per cent could hardly escape detection. It cannot be considered to be proved, however, that the molecules of any one substance are alike in every way, in the sense that a hundred standard machine screws are alike, for the question has not yet been tested exhaustively enough. Graham's method and Stas' method furnish evidence to which proper weight should be given, but they cannot be said to be conclusive. Neither can we admit the evidence of the spectroscope to be conclusive, although it indicates that the internal vibrations of a molecule of hydrogen (for example) are performed with the same rapidity, whether the hydrogen is obtained from water, or from organic bodies, or from the gases that are occluded by meteorites, and brought to us from the depths of space. The identity of molecules of the same substance is nevertheless a fundamental assumption of the usual molecular theory, and it will be assumed in the present article.

All matter may be classified, for present purposes, as (1) gaseous, (2) liquid, or (3) solid. (See MATTER.) Gases are assumed to consist of molecules which are distributed through the space occupied by the gas in such a manner that the average distance from one molecule to the next one is large in comparison with the diameter of any one molecule. The molecules are all believed to be in rapid motion, so that from time to time they collide with one another; and when a collision occurs, it is believed that the molecules that come together rebound again as if they were perfectly elastic bodies. They have motions of rotation as well as of translation, and the collisions affect both the rotative and the translatory velocities of the colliding molecules. A system composed of a practically infinite number of bodies of this sort will have certain properties which are considered in the article GASES, KINETIC THEORY OF, and shown to be in general agreement with the properties of the actual gases of nature. The molecules of a gas undoubtedly attract one another under ordinary circumstances; but it is assumed that they are so far apart during the greater part of the time, that the attractive forces that exist do not have any great effect upon the motions of the system as a whole. The path of a molecule of gas, between two successive collisions, is called the "free path" of the molecule, and is believed to be sensibly straight, owing to the high velocities that the molecules of a gas have on the average, and the (assumed) fact that the attractive forces are unimportant at distances comparable in magnitude with the mean "free path." It may be shown by the methods of the kinetic theory of gases that the average velocity of a hydrogen molecule, at atmospheric pressure and at the freezing point of water, is about 5,571 feet per second. The average velocities of several other familiar gases, under the same conditions, are as follows: Oxygen, 1,394 feet per second; nitrogen, 1,488; carbon monoxid, 1,491; carbon dioxid, 1,189. Clausius deduced, from the kinetic theory of gases, a formula giving the mean free path of a gas in terms of the temperature of the gas, its density at 32° F. and under a pressure of one atmosphere, and its "coefficient of viscosity." (See VISCOSITY.) With the experimental data that have been obtained for the coefficients of viscosity of the more familiar gases, the following values of the average free paths of the molecules of these gases are obtained from the formula in question, the unit in each case being the ten-millionth part of an inch, and the gas being supposed to be exposed to a pressure of one atmosphere, and a temperature of 32° F.: Hydrogen, 67; nitrogen, 36; oxygen, 38; carbon monoxid, 36; carbon dioxid, 25. If the average speed of translation of a gaseous molecule, in inches per second, be divided by the length of the average free path in inches, the quotient is the number of collisions that the molecule experiences, on an average, per second. In this way it may be shown that in hydrogen at the density and temperature given above, each molecule experiences, on an average, 10,040 million collisions with its neighbors per second. The corresponding numbers of collisions for the other gases (in millions per second) are as follows: Nitrogen, 5,021; oxygen, 4,410; carbon monoxid, 5,014; carbon dioxid, 5,741. The length of the free path of a given gas is increased, when the density of the gas is diminished, in the exact inverse ratio of the change in density. In an exhausted tube containing hydrogen, for example, at a density one one-millionth of the density assumed above, the mean free path of the molecules would be a million times as great as the value given for hydrogen at the normal density;—that is, the free path at this particular exhaustion would be 6.7 inches, so that the molecules would travel, on an average, over six inches between successive collisions. As the kinetic theory of gases assumes that the molecules collide with one another after traveling distances that are negligible in comparison with the dimensions of the whole mass of gas under consideration, its conclusions, when applied to gaseous masses in which this condition is not fulfilled, must be received with proper caution. Clausius' formula, for example, is itself doubtful when applied to the extreme case in which the density of the hydrogen is only a millionth of the normal value. It is certain, however, that the free paths of gas molecules at such high exhaustions are to be measured in inches, and it is also certain that the pressure is not necessarily equal in all directions in vacua of this degree of perfection, since it is by means of the incessant collisions that this equality of pressure is brought about at ordinary densities. For these reasons (among others) Sir William Crookes considered that highly attenuated gases, in which the pressure is a millionth of an atmosphere or less, should be considered as constituting a "fourth state" of matter, essentially distinct in its properties from the three states that are commonly recognized. He also devised the radiometer and other instruments, to show the reality of the differences of pressure that can exist in high vacua. In recent years it has become increasingly probable that in certain forms (at any rate) of the apparatus devised by Crookes,— in those forms, namely, in which "cathode rays" are generated by the action of powerfully excited electrodes,— the mechanical effects that are observed are not due directly to the motions of the gas molecules themselves, but rather to the motions of the free "electrons" of which these molecules are ultimately composed, and which are liberated by the disintegration of the gas molecules under the influence of the powerful electric discharge. Crookes himself appears to have held views not essentially different from this, though at the time they were stated they were clothed in language that was necessarily rather indefinite, since the electron hypothesis had not then taken form. (See ELECTRON; RADIATION.)

In liquids, the molecules are supposed to be so near together that the attractive forces that they exert upon one another are powerful at all times. The kinetic theory of liquids is very imperfectly understood, but it is considered certain that collisions occur among the molecules just as they do in gases, and that the colliding molecules rebound from one another like perfectly elastic bodies. In liquids, however, there is nothing strictly analogous to the "free path" in gases; for the liquid molecules are always exposed to attractive forces of considerable magnitude, and hence in the intervals between successive collisions they describe paths that are everywhere markedly curved. There is, doubtless, as great a variety of velocities among the molecules of a liquid as among those of a gas, but the law of distribution of velocities among liquid molecules has not yet been determined, on account of the mathematical difficulties that are involved, and which have thus far proved insuperable. Admitting the fact that the velocities of the molecules are unequal, let us consider what would happen at a free surface of the liquid, assuming for the moment that above this free surface there is a boundless vacuum. A molecule that is well within the liquid is attracted, on the whole, equally in all directions. A molecule at the surface, however, is attracted only downward. Hence it is evident that when a molecule, in the course of its wanderings, comes to the surface, the possibility of its escape from the liquid depends upon the magnitude of the vertical component of its velocity. If this vertical component is sufficient to carry the molecule beyond the range of sensible attraction of the liquid, the molecule will pass away indefinitely into the space above. On the other hand, if the vertical component of its velocity is not sufficient to carry the molecule beyond the range of sensible attraction of the liquid, it will rise into the vacuous space only a short distance, its upward velocity growing less and less, under the influence of the downward attractive forces, until it vanishes altogether; after which the molecule will begin to fall back, and it will finally plunge into the liquid again. From the slowness with which free evaporation takes place, we must conclude that by far the greater part of the molecules that start upward fall back into the liquid. Those that do escape by reason of their great velocities carry off more than their equable share of the kinetic energy of the molecules of the liquid, and this causes the average kinetic energy of the liquid, per molecule, to grow continually less. In other words, free evaporation causes a reduction of the temperature of the mother liquid. When the liquid is enclosed in a containing vessel of finite volume, the phenomena are somewhat different, after the evaporation has proceeded for a time. If the space above the liquid is vacuous at the outset, the evaporation, at the first instant, takes place precisely as before. Of the molecules that come to the surface of the liquid, those that are moving most rapidly in a vertical direction fly off as in the case previously considered; but they can no longer pass away indefinitely into space. They are now retained in the vessel, in which they will accumulate, constituting a gas or vapor whose density will go on increasing until a certain limit is reached. The molecules composing this vapor will travel in every direction, precisely as they do in other gaseous bodies. Many of them, therefore, will plunge back into the liquid again, and become an integral part of it once more. Now the number of molecules that leave the mother liquid in a given time will be quite independent of the density overhead; but the number that fly back into it again, in a given time, will be greater, the greater the density of the vapor. At the beginning of the evaporation the vapor will be quite rare, and the number of molecules that fly off in any given time will greatly exceed the number that return during that time. The density of the vapor will therefore increase. After a certain interval (exceedingly short as measured by ordinary standards), the density of the vapor will become so great that the number of molecules plunging back into the liquid in a given time will become sensibly equal to the number that fly off from it in the same time. When this adjustment becomes perfect, the density of the vapor will no longer increase. It is then said to be "saturated," and its density will remain constant until the temperature of the system is altered. If the temperature be now raised, all the molecules will be accelerated, and hence more molecules will plunge from the vapor into the liquid in a given time than before, and more molecules will also come to the surface of the liquid from the interior. Furthermore, of the increased number of molecules that emerge from the interior of the liquid, a larger proportion than before will have velocities exceeding the critical velocity that a molecule must have in order to escape from the attraction of its fellows. Hence, on the whole, the density of the vapor will increase, approaching a new limit at which the number of in-coming and out-going molecules will again become equal. It follows, therefore, that for any vapor in contact with its liquid, there is a definite density corresponding to each temperature. The existence of a critical point (q.v.) may be explained in a similar manner, by considering the average kinetic energy that a molecule must have in order that it may be able to pass away from the attraction of other molecules in its immediate vicinity. A stone thrown upward by the hand does not proceed far before the attractive force of the earth annuls its velocity and causes it to fall back again. A rifle will project a ball far higher, but the ball will eventually fall back, just as the stone did. With a good modern cannon we can throw a projectile several miles into the air,—and still it falls back. But we might conceivably project one with such a speed that it would leave the earth forever. It may be shown, in fact, that if the retarding action of the air is omitted from consideration, an initial vertical speed of 36,700 feet per second would be quite sufficient. With this much premised, conceive two molecules of a gas to be in contact, and let a sudden impulse be given to one of them, to drive it away from the other one. If the impulse is small enough, the disturbed molecule will only travel a short distance, and will then fall back to its original position; but we may give it such a speed that the attractive force of the fixed molecule will fail to bring it back, and in this case it will travel onward indefinitely. Now, just as in the case of the cannon-ball and the earth, there must be some intermediate initial speed that will be *just sufficient* to separate the two molecules under consideration. We may call this the «critical velocity,» and we may say that if the molecules of a gas are moving about so that, on an average, when two of them collide they have a relative velocity greater than this critical value, the gas in question cannot be liquefied by pressure alone; for even if its molecules were forced almost into absolute contact with one another, their velocities would be sufficient to separate them again indefinitely, as soon as the pressure was removed. From this, and from the relation between temperature and molecular velocity in gases (see GASES, KINETIC THEORY OF), it follows that for every gas there is a temperature above which the gas cannot be liquefied by any pressure whatever.

Very little is known about the molecular constitution of solid bodies. The most obvious property of a solid is, that it preserves its shape so long as it is not acted upon by external forces. Moreover, when such forces are applied, the solid indeed becomes deformed, but it eventually regains its original shape after the forces have been removed, provided they did not exceed a certain magnitude called the «elastic limit,» which is peculiar to the solid under examination, and to the way in which the forces were applied. We are obliged to conclude, from these facts, that the molecules of a solid are not free to roam about, but that some or all of them have determinate mean positions about which they may oscillate and rotate, but from which they never permanently depart except when constrained to do so by an external force great enough to overcome the internal forces (whatever they may be) which normally determine the mean positions of the molecules. Some solids are brittle toward forces that are suddenly applied to them, although they yield slowly, and after the manner of a viscous fluid, to smaller forces that are applied continuously for a long time. A mass of cold pitch, for example, may be easily shattered by a blow, and yet when allowed to rest for a sufficient time upon an inclined plane, it yields gradually to the relatively insignificant force of gravity, loses its shape, and very slowly flows down the plane. It is evident that solids of this character must have exceedingly complicated structures. Maxwell suggested that they consist of two kinds of molecular groups, of which one is more stable than the other, and he supported his argument with considerable ingenuity. His views were purely speculative, however, and it appears to be fairly evident that the first advances that we make toward a good understanding of the molecular structure of solids must be based upon a study of bodies of crystalline nature, like quartz and iron.

It is certain that in crystals there is some definite regularity of orientation, either in the molecules themselves, or in their motions; and it may be fair to assume that this regularity is of such nature that any given molecule, in its vibratory excursions, never passes outside of a certain imaginary ellipsoid, which may be conceived to be described about the mean position of the molecule. Crystals may then be regarded as aggregates of such ellipsoids, piled up in such a way that the corresponding axes of all of them are either parallel throughout the mass, or at least arranged in accordance with some definite geometrical scheme. When a substance crystallizes, either from solution or from a state of fusion, the ellipsoids that bound the crystal molecules must necessarily arrange themselves so that the potential energy of the resulting solid is as small as it can be, consistently with the conditions under which the solidification takes place. For the sake of illustrating the application of the molecular theory to the explanation of crystal structure, we may assume the ellipsoids to be simple spheres, and we may also assume that the potential energy of the system is least when the spheres are grouped together as closely as possible. The problem of crystal structure is then reduced, in its geometrical aspect, to the simple one of finding out how to pack the greatest number of equal spherical balls into a given space; and in order to properly comprehend the principles that are involved, a little patient experimentation with a liberal supply of buckshot or spherical bullets is desirable. It will be found that pyramids can be built with them, apparently in several ways; though the internal structure of the pile is really the same in all cases. The slant faces of these pyramids correspond to the plane faces of the actual crystal. When a crystal is forming (say by deposition from a solution) we are to conceive that a continuous series of exchanges is going on, all over its surface. Molecules of the dissolved substance are caught by the attraction of the growing crystal, but, on the other hand, molecules of the solidified crystal are continually passing into solution again; and the gradual increase in size of the crystal is due to the fact that in a unit time more molecules are caught by it than are lost again. Suppose, now, that the surface of a partially formed crystal is injured slightly, and let us represent the injury, in our shot pile, by removing a few of the shot from one of the faces of a pyramid. A molecule that happens to lodge in the injured place will be in contact with more of the other attracting spheres than it would touch if it were to collide with one of the uninjured parts of the crystal, and it will therefore be held more firmly in place. In the exchange of molecules between the crystal and the solution, a molecule thus embedded will be less likely to be torn away again; and this action tends to preserve the flatness of the faces of the growing crystal, and to cause the repair of damaged places to proceed with greater rapidity than the growth along normal, uninjured parts.

Attempts have been made to unify our knowledge of matter, by the comparison of what are known as «corresponding states» of different kinds of matter. The general conception of «corresponding states» is difficult to define, and the sense in which the phrase is used may be best illustrated, perhaps, by the following simple illustration. Two gases which are at their respective critical points (see CRITICAL POINT) may be considered to be in corresponding states. Let P_1, V_1 and T_1 be, respectively, the critical pressure, the critical volume of a unit mass, and the critical temperature (on the absolute scale) of one of these gases, and let the pressure, volume and absolute temperature of this same gas in any other state be represented by P, V and T. Instead of measuring these last quantities in the usual units, let them be expressed as fractions of the corresponding critical values; so that the pressure, volume and temperature of the gas will be respectively P/P_1, V/V_1 and T/T_1, as expressed in the new units. In the same manner, let the pressure, volume and temperature of the second gas be expressed in terms of the critical constants of the second gas. Then the two gases are said to be in «corresponding states» whenever the pressure, volume and temperature of the first gas are respectively equal to those of the second one, when all are expressed in this manner. The idea of «corresponding states» was discussed at some length by Van der Waals ('Continuité des Etats Gazeux et Liquides'), and has also been employed by Gibbs and others for various purposes.

It has been said, above, that the molecules of bodies attract one another. We do not know much, however, about the mechanism by which the attraction makes itself felt, nor even about the law in accordance with which the attraction falls off with increasing distance. It would be natural to assume it to vary as the inverse square of the distance, but it is usually held that there is good evidence that it falls off more rapidly than this, as the distance increases. Maxwell assumed, in certain of his writings, that the attraction varies as the inverse fifth power of the distance, but he apparently chose this law merely because it rendered certain of his equations more manageable. William Sutherland has advanced reasons for believing that the inverse fourth power is more nearly correct, for the distances that are commonest between the molecules of gases under ordinary conditions of density. We do not even know that the forces between molecules are «central,» — that is, we do not know that the attractive force exerted by a molecule tends toward a definite point within the substance of the molecule. Helmholtz showed, in a paper published in 1847, that if the universe consists of smooth spherical molecules, which attract one another only by forces that are directed toward their centres, the great fact of the conservation of energy is a necessary consequence (see ENERGY); but unfortunately we now have good reason for believing that molecules are not bodies of this sort, and hence the principle of the conservation of energy must be regarded as a mere fact of observation. The distance at which the attractive force exerted by a molecule is still sensible is of course indefinite, depending as it does upon the delicacy of the means that are employed for the detection of the force. Maxwell showed that a soap-bubble would become unstable when its thickness is reduced until it is only equal to the radius of sensible molecular attractive power; and as Reinold and Rücker have shown that soap-films become unstable at a thickness of about one two-millionth of an inch, we may take this as a rough estimate of the limiting distance at which molecular attractive power ceases to be sensible.

The aggregate volume of all the molecules in a given mass of gas may be obtained, to a rough approximation, by several methods, among which we may mention the so-called «characteristic gas equation,» which exhibits the relation between the pressure, density and temperature of a gas. Equations of this sort have been given by Van der Waals, Clausius and others, and in them a term occurs whose value depends upon the proportion that the bulk of the actual molecules bears to the total bulk of the gas that they constitute. The numerical magnitude of this term may be determined by experiments upon the variation of the pressure of a gas with temperature and density, and hence the aggregate bulk of all the molecules may be determined in a somewhat approximate manner. Roughly, it may be said that at ordinary densities, the actual total bulk of all of the molecules of a gas is from the thousandth to the ten-thousandth part of the bulk of the entire gas. Clausius has shown, from the kinetic theory of gases, that the diameter, D, of a gas molecule may be expressed in terms of the mean free path (L) and the proportion (B) of the total bulk of the gas that is actually occupied by molecules, by means of the simple equation $D = 8.5\ LB$. When we know L and B it therefore becomes easy to compute the diameter of a molecule; but it must be remembered that the phrase «diameter of a molecule» has no very definite meaning at present, and cannot have until we know much more about the nature of molecules. In fact, to ask how big a molecule is, is much like asking «How big is a crowd?» Clausius' equation, when applied to the existing data for B and L, indicates that the diameter of a gaseous molecule is something like the fifty-millionth part of an inch. Treating the molecule as a sphere, we may then show that the number of molecules in a cubic inch of gas at 32° F. and one atmosphere of pressure is approximately 100 millions of millions of millions, though this figure can be regarded only as the roughest kind of an approximation.

We know practically nothing of the actual nature of a molecule. Some of the assumptions that have been made by mathematicians are explained in the article GASES, KINETIC THEORY OF; but it is not probable that these assumptions correspond in the least degree with the actual facts. Lord Kelvin has advanced the idea that they may be similar in structure to the smoke-rings that are blown by skilful smokers; that is, he has suggested that the molecules are vortices in the ether which is known to fill space. This theory is quite suggestive and helpful in some respects, but it can hardly be regarded as more than an interesting though improbable speculation. The electron theory of J. J. Thomson is more in favor at the present time (see ELECTRON), although it has not yet been fully tested. According to this view, molecules are built up of far smaller elementary corpuscles, or «electrons,» about 1,000 of these being required for a hydrogen atom, 16,000 for an oxygen atom, 200,000 for a mercury atom, and so on, the number being proportional to the atomic weight of the element under consideration. These electrons are supposed to be all alike, and to be practically nothing but tiny detached charges of electricity, floating through the ether. They are believed to exist practically in the free state in the cathode rays that are visible in Crookes' tubes. According to this view, chemical affinity is merely an electric force acting between atoms, and the inertia of a molecule is merely a mathematical consequence of the extremely rapid motions of the electrons of which the molecule consists. It may be proved, indeed, that an electrified body in rapid motion possesses an apparent mass that is greater than the mass as measured by the ordinary methods of mechanics. At any ordinary velocity, this apparent increase in mass is probably not measurable; but at the high velocities which the electrons (for other reasons) are believed to have, the «pseudo-mass» may easily become as great as the real mass; and the present tendency is, to regard what we have called the «real mass» of a molecule as having no existence, and to attribute the mass of a body entirely to the enormous velocities of its constituent electrons.

Consult: Meyer, 'Kinetic Theory of Gases'; Kelvin, 'Popular Lectures and Addresses,' Vol. I.; Risteen, 'Molecules and the Molecular Theory.' J. J. Thomson's electron theory is too recent and too incomplete to find a place, as yet, in such treatises, and for this the current scientific periodicals must be consulted. See, however, Larmor's 'Matter and Aether.'

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Mole'skin, a fabric so called from its being soft like the skin of a mole. It is a strong twilled cotton fabric, cropped or shorn before dyeing. In the United States the word is also applied to the padded breeches worn by football players.

Molesworth, SIR **Guilford Lindsey,** English civil engineer: b. Milbrook, Hampshire, 3 May 1828. He studied at King's School, Canterbury, and at the Putney College of Civil Engineers; was apprentice to the chief engineer of the London and Northwestern Railway; was employed at Woolwich Arsenal during the Crimean war; went to Ceylon 1859, becoming director-general of railways there in 1867; and in 1871 was appointed consulting engineer to the government of India. He received decorations for his services in the Afghan and Burma wars, and retired in 1889. He wrote a standard 'Pocket-Book of Engineering Formulæ,' various other works on technical subjects, 'Imperialism in India' (1885); 'Reason and Instinct in Ants' (1886), and a prize essay 'Silver and Gold' (1891).

Molesworth, mōlz'wėrth, **Mary Louisa Stewart,** English writer of juvenile stories: b. Holland 1842. In 1861 she was married to Major Molesworth of the Royal Dragoons. Her earlier writings were novels under the pen-name «Ennis Graham»; she wrote her first children's stories about 1875 and gained an immediate success. Her more famous titles are: 'Carrots' (1876); 'The Green Casket' (1890); 'Meg Langholme' (1897); 'The Laurel Walk' (1898); 'The Grim House' (1899); 'This and That,' 'The House that Grew,' and 'Peterkin.' Among her later novels are 'Hathercourt Rectory'; 'The Red Grange.'

Molesworth, SIR **William,** English politician: b. London, England, 23 May 1810; d. there 22 Oct. 1855. In 1823 he succeeded as 8th baronet; studied at Cambridge, but was obliged to leave because of his having challenged a tutor to a duel, and completed his education at Edinburgh, and in Germany. He was a member of Parliament for East Cornwall 1832–7, for Leeds 1837–41, and for Southwark from 1845 till his death. In 1853 he became first commissioner of public works under the Earl of Aberdeen, and in 1855 was colonial secretary under Palmerston. The close friend of Bentham and James Mill, he was looked upon as the parliamentary exponent of the «philosophical Radicals.» He founded the 'London Review' in 1835 and the next year merged it in the 'Westminster Review' which he had purchased, and contributed many articles to this organ of radicalism. He edited the complete works of Hobbes in 16 volumes and published them at his own expense. He is best known as having drawn public attention to the abuses connected with the transportation of criminals, and as having pointed out the maladministration of affairs in the colonial office, investigated the relations between the imperial government and the colonial dependencies, and expounded the true principles of colonial self-government.

Molfetta, mōl-fĕt'tä, Italy, a seaport city in the province of Bari, on the Adriatic, 15 miles northwest of the city of Bari. It has a magnificent cathedral, several other churches, a college; manufactures of linen and saltpeter; a harbor, well sheltered except on the north; and a considerable trade in corn, oil, and fruit. Pop. about 44,000.

Molière, mō-lē-är (assumed name of JEAN BAPTISTE POCQUELIN, zhŏṅ bä-tēst pŏk-ĕ-lăṅ), French dramatist: b. Paris 15 Jan. 1622; d. there 17 Feb. 1673. His father was *valet de chambre* and upholsterer to the king. When his father had become debilitated he had to discharge his office about the person of Louis XIII. In 1641 he accompanied the king to Narbonne. The French theatre had at that time begun to flourish through the talents of the great Corneille; and young Pocquelin, who had imbibed a strong passion for the stage, now formed a company of young persons of similar tastes, exchanged his family name for that of *Molière,* and resigned the office of his father. His company soon became distinguished; and we find him at the head of a strolling troop, which acted ‘L'Etourdi’ at Lyons in 1653. This is the first comedy written in verse by Molière. The truth of the dialogue, the inexhaustible skill of a valet continually employed in rectifying the blunders of his master, the interest of the situations arising therefrom, have kept this piece on the stage notwithstanding the want of connection between the parts. Molière gained equal applause as a poet and an actor, and drew all the spectators from another company at Lyons. The art of representing character and manners on the comic stage was reserved for Molière. ‘L'Etourdi’ was acted with equal applause in Béziers. Here the Prince of Conti, who had known Molière at school, had just assembled the estates of Languedoc. He received the poet as a friend, and entrusted him with the charge of amusing the town and the assembly. ‘Le Dépit Amoureux’ and ‘Les Précieuses Ridicules’ were brought forward in the theatre of Béziers. In ‘Le Dépit Amoureux’ the incidents are better arranged than in ‘L'Etourdi.’ In the actions of the personages a genuine comic vein is exhibited, and their language displays much spirit and humor; but the plot is too complicated, and the *dénouement* not sufficiently probable. The plot in the ‘Précieuses Ridicules’ is more simple. A delicate satire on the prevailing affectation of the character of *bel esprit* and of a romantic style, on the pedantry of learned females, and affectation in language, thoughts, and dress, is the object of this comedy. It produced a general reform when it was brought forward in Paris. The spectators laughed, recognized themselves, and applauded. Louis XIV., well pleased with the performances of Molière's company, made it his own company, and gave its director a pension of 1,000 livres. ‘Sganarelle, ou le Cocu Imaginaire’ appeared in 1660. This piece also contains a fund of sportive humor, and keeps the spectators continually amused. Censure was not silent on its appearance, but was not listened to. ‘Don Garcie de Navarre,’ in imitation of the Spanish, was criticized with more justice. It is a cold attempt at a more elevated style. ‘L'Ecole des Maris’ the idea of which is drawn from the ‘Adelphi’ of Terence, contains a simple and entertaining plot and a natural *dénouement.* The theatre still resounded with the applause with which this piece was received, when ‘Les Fâcheux,’ projected, executed, and committed to memory by the actors within a fortnight, was performed at Vaux at the residence of Fouquet, intendant of finances, in the presence of the king and court. This comedy is almost destitute of plot, but the intention was to interest the spectators by the multiplicity of characters, the truth of the portraits, and by the elegance of the language. It is said that the king, on going away from the first performance, happening to see the Count Soyecourt, a tiresome narrator of his exploits in the chase, said to Molière, “There is an original that you have not copied.” In 24 hours the scene of the hunter was inserted; and as Molière was not acquainted with the terms of the chase, he requested Soyecourt himself to explain them to him. ‘L'Ecole des Femmes’ (1662) met with critics, who, overlooking the art which prevails in the management of the inferior personages, and in the natural and quick transition from one surprise to another, animadverted upon some negligences of style. Molière answered them by his spirited ‘Critique de l'Ecole des Femmes.’ The ‘Impromptu de Versailles’ was a reprisal occasioned by an attack of Boursault, who had written a piece against him, entitled ‘Le Portrait du Peintre.’ The court was much pleased in 1664 with ‘La Princesse d'Elide,’ a comic ballet, prepared for an entertainment given by the king. Another ballet, ‘Le Mariage forcé,’ is drawn from Rabelais. ‘Don Juan, ou le Festin de Pierre,’ excited much reprehension by the impiety of some of the expressions placed in the mouth of the profligate hero. Molière retrenched the objectionable parts in the second representation. ‘L'Amour Médecin’ is one of the over-hasty works which are not to be strictly criticized. It was written, studied, and represented within five days. In this Molière for the first time attacks the physicians. His great piece, ‘Le Misanthrope,’ was but moderately well received at first, but in the sequel was justly considered as one of the finest productions of modern comedy. It has been more admired in the closet than it has pleased on the stage — the reason Voltaire believes to be because the plot is delicate and ingenious rather than lively and interesting; because the dialogue, with all its beauty, does not always seem necessary, and therefore retards the action; and because the *dénouement,* though skilfully introduced, leaves the spectator unexcited. In 1665 appeared ‘Le Médecin malgré lui,’ a farce full of humor. ‘Le Sicilien, ou l'Amour Peintre,’ is a short piece which pleases by its grace and gallantry. But his reputation was carried to its highest summit when ‘Le Tartufe’ appeared. In this hypocrisy is fully unveiled, the characters are equally various and true, the dialogue is elegant and natural, the *dénouement* alone is unsatisfactory. An impious and obscene farce, entitled ‘Scaramouche,’ having been represented at court, the king said to the great Condé, as he was leaving the theatre in his company, “I should like to know why the people, who are so much scandalized at Molière, say nothing about ‘Scaramouche.’ ” “The reason is,” replied the prince, “that ‘Scaramouche’ ridicules only God and religion, about which these people care nothing, while Molière's piece ridicules themselves.” In 1668 Molière published his ‘Amphitryon,’ a free imitation of Plautus. With the exception of a tedious scene between Jupiter and Alcmena, nothing can be more humorous. ‘L'Avare’ (the Miser), an imitation of the ‘Aulularia’ of Plautus, is, in the leading character, a little overdone; but the multitude is only to be struck by strong traits. ‘George Dandin, ou le Mari confondu’; ‘Monsieur de Pourceaugnac’; ‘Les Fourberies de Scapin,’ are rather amusing than instructive. ‘Le Bourgeois Gentilhomme,’ though mixed with some buffooneries, is full of power. Molière bestowed more care on his ‘Femmes Savantes,’ a witty satire on affected taste and pedantic learning, which at that time prevailed in the Hôtel de Rambouillet. The incidents are not all well connected; but the subject, dry as it may be in itself, is exhibited in a truly comic form. The development is admirable, and has been a hundred times imitated. The same is true of the ‘Malade imaginaire,’ in which the quackery and pedantry of the physicians of the times are fully delineated. With this piece the author concluded his career. He was indisposed when it was performed, and the exertion with which he played produced convulsions, followed by a hemorrhage, and he died after the lapse of a few hours. The archbishop of Paris at first refused him burial; but the king himself insisted on it, and he was interred in the cemetery behind the chapel of St. Joseph, Rue Montmartre. In 1792 his remains were transferred to the Museum of French Monuments, whence in 1817 they were removed to Père Lachaise.

Molière is the true father of French comedy. His works may be considered as a history of the manners, fashions, and tastes of his times, and as the most faithful pictures of human life. Born with an observing mind, skilful in catching the outward marks of the passions and emotions, he took men as they were, and, with singular felicity, exhibited the most sacred recesses of their hearts, and the tone, the action, and the language of their various feelings. Of all who have ever written, Molière is the one who has best observed men without seeming to do so. His knowledge of human character seems to have come by intuition. In his domestic relations Molière was not fully happy; he who made merry on the stage with the weaknesses of other men could not guard against his own weakness. A violent passion induced him to marry the daughter of the actress Béjart, and he thereby incurred the ridicule he had so often cast on husbands of a disproportioned age. As an actor Molière was not to be surpassed in high comic parts, such as Arnolphe, Orgon, Harpagon, etc. An edition of Molière published at Paris in 1838 gave the actors' names after the *dramatis personæ*, from which we learn that Molière always played the principal comic parts himself. Among the last and best editions are those of Monval (8 vols. 1882); A. France (7 vols., 1876–91); and Desfois and Mesnard (11 vols., 1873–93). Consult biographies by Lotheissen (1880); Mahrenholtz (1881); Moland (1886); Larroumet (1886); Baluffe (1886); Mesnard (1889); Desfeuilles (1900); Schneegans (1901). Also Lacroix, 'Bibliographie Molièresque' (1875); Loiseleur, 'Points obscurs de la Vie de la Molière' (1877); Livet, 'Lexique de la Langue de Molière' (1895–7).

Molina, mō-lē'nä, **Alonso de**, Spanish missionary: b. Escalona, Spain, about 1510; d. Mexico 1584. He accompanied his parents to San Domingo, and in 1523 went to Mexico, where he learned the Aztec language and acted as interpreter to the Franciscan monks, whose order he subsequently joined and engaged in missionary work, in which he was very successful. He was superior of the province of Santo Evangelio, and his books are among the earliest printed in America. Among them are: 'Diccionario de la lengua Castellana y Mexicana' (1555); 'Arte de la lengua Mexicana' (1578); and several works in the Aztec language.

Molina, Juan Ignacio, hoo-än' ēg-nä'sē-ō, Chilean historian: b. province of Talca, Chile, 24 June 1737; d. Bologna, Italy, 12 Sept. 1829. He was educated in the Jesuit College at Santiago, and entering the order after its expulsion from America in 1767, settled in Italy. After 1774 he lived at Bologna, teaching and writing. He published 'Compendium of Chilean History' (1776); 'Essay on Chilean Natural History' (1782); 'Essay on Chilean Civil History' (1787), the last-named being translated into several languages, including English, etc.

Molina, Olegario, Mexican statesman: b. Bolonchenticul, Campeche, 1843. He was educated in the Seminary of San Ildefonso, Merida, where he subsequently became a professor. Later he founded in Merida a school of primary and secondary instruction, and still later a benevolent society known as 'The Youth.' While still young he established and conducted two journals, *La Guirnalda* and *Yucatan*. He was then elected to the Merida city council and later served one term in the national congress. He then returned to Yucatan and served as fiscal magistrate of the superior court of the state till he retired to enter the field of business. In 1877 Molina took charge of the construction of the first railway in Yucatan,—the line which connects the cities of Merida and Progreso,—completing it in two years notwithstanding most discouraging conditions, and afterward and until 1881 operating it as manager. In the latter year he organized the present commission and banking house of O. Molina & Co. In 1902 he was elected governor of his state for the four years ending 1906, when he was re-elected. Because of ill health he retired from the governorship at the end of the first year of his second term. In March 1907 he was appointed by President Diaz to the cabinet position of secretary of Fomento, colonization and industry.

During his five years' service as governor Mr. Molina introduced and successfully carried through many important public improvements and reforms in the several departments of government, greatly advanced the cause of education, stamped out yellow fever at Merida and built a fine general hospital and an asylum for the insane.

Molinari, mō-lē-nä-rē, **Gustave de**, Belgian political economist: b. Liège, Belgium, 3 March 1819. He studied medicine and became a homœopathic physician in Brussels, but upon removing to Paris he entered journalism. His reputation as a radical compelled him to return to Belgium upon the accession of Napoleon III., and he was appointed to the chair of political economy in the Musée Royal d'Industrie Belge. In 1881 he returned to Paris and edited the 'Journal des Economistes' and later founded the journals 'L'Economiste Belge' and 'La Bourse du Travail.' Among his books are: 'Etudes économiques' (1846); 'Cours d'Economie politique' (1861); 'L'Evolution économique' (1880); 'Comment se résoudra la question sociale' (1896), etc.

Moline, mō-lēn', Ill., city in Rock Island County; on the Mississippi River, and on the Chicago, R. I. & P., the Chicago, B. & Q., and the Chicago, M. & St. P. R.R.'s; about three miles east of Rock Island, nearly opposite Davenport, Ia., and about 155 miles west of Chicago. In the part of the river between Moline and Davenport is an island from which to the shore have been built dams to secure water-power. Moline has good water-power which is utilized in developing the manufacturing industries. The extensive coal fields in the near vicinity contribute to the industrial development of the city. The chief manufactures are wagons, carriages, agricultural machinery, steel, foundry and machine-shop products, steam engines, saw- and planing-mill products, pumps, paper, flour, and dairy products. Some of the prominent buildings are a library building, which cost (1903) $50,000, a city hospital, several fine church and school buildings. The city library was founded in 1892 and (1904) contains about 10,000 volumes. There is a good library connected with the high school. The city owns and operates the waterworks. Pop. (1890) 12,000; (1900) 17,248; (1910) 24,199.

Molino del Rey, mō-lē'nō dĕl rā. See Mexican War.

Molinos, Miguel de, mē-gĕl' dā mō-lē'nōs, Spanish mystic, founder of the Quietists: b. near Saragossa 21 Dec. 1640; d. Rome 29 Dec. 1696. He studied at Pamplona and Coimbra, took holy orders, went to Rome in 1669, and there published in 1675 his 'Guida spirituale,' which urged the immediate presence of God and pure love toward God as the only way to salvation and peace, which can not be attained until the soul is free from all that is material. His opponents, notably the Jesuits, held that this meant the indifference of the individual to the external world. In 1685 he was summoned before the Inquisition; two years later was found guilty of spreading dangerous doctrines. He publicly recanted all his teachings and was imprisoned until his death. Even Pope Innocent XI., a friend of Molinos, was examined by the Inquisition — but not as Pope, merely as Odescalchi, an individual. The 'Spiritual Guide' has been translated into the languages of Europe. See Quietism. Consult Bigelow, 'Molinos the Quietist.'

Mollah, mŏl'a, or **Mullah,** mŭl'a, a Turkish title, originally meaning simply «lord,» or «sir,» in its narrower usage a judicial rank. In Turkey there are three classes of mollahs, with jurisdiction over divisions of various importance; those in control of small towns constitute the lowest grade; they, like the second grade, hold office only for a month at a time; the first grade is made up of those having legal authority over pashaliks. The mollah ranks below the kahiaskar and mufti, but is superior to the cadi. He is versed in both ecclesiastical and civil lore. Hence, and because of its original meaning, the word is often used more loosely of Mohammedan dignitaries or scholars in Africa. See Mad Mullah.

Mollendo, mōl-lān'dō, Peru, a seaport on the Pacific coast, in the department of Arequipa, near the mouth of the river Tambo, and seven miles south of Islay. A railway connects it with Puno on Lake Titicaca. It is the port through which the principal imports and exports of southern Peru and Bolivia pass. The principal exports are alpaca, wool, silver, and copper ores. Pop. over 2,000.

Molloy, J. Fitzgerald, English biographer. Among his numerous works may be cited: 'Court Life Below Stairs, or London Under the First Georges' (1882); 'Court Life Below Stairs, or London under the Last Georges' (1883); 'Life and Adventures of Peg Woffington' (1884); 'Life and Adventures of Edmond Kean' (1888); 'The Most Gorgeous Lady Blessington' (1896); 'Historical and Biographical Studies' (1897); 'The Queen's Comrade' (1901).

Mollusca, one of the great divisions or phyla of the animal kingdom, containing the oysters, clams, snails, slugs, squid and cuttlefish. The group is sharply marked off from all others and is characterized by the following features: The body is primarily bilaterally symmetrical with the mouth and anus at the two ends of the body, the alimentary tract traversing it as an axis. On the lower surface of the body is developed a muscular outgrowth, the foot; while on either side a fold of skin arises near the back and hangs down enclosing a space between it and the body and foot. The fold is the *pallium* or mantle, and the cavity is called the mantle or branchial chamber, from the fact that the true gills (*ctenidia*) arise in the angle between mantle and body and project into the space. The dorsal surface of the body usually has the power of secreting a protective shell, ordinarily strengthened by carbonate of lime. The heart, which always contains arterial blood, lies in a chamber (the *pericardium*) dorsal to the intestines, while the excretory organs, which are true nephridia, connect the pericardium with the outer world. The nervous system consists of a series of paired ganglia connected by nerve-trunks. Of these ganglia the most constant are (1) the cerebral, at the anterior end, above the œsophagus; (2) the pedal in the foot; (3) the parietal on the sides of the body; and (4) the visceral near the hind end of the body ventral to the intestine. All of the ten thousand species of living mollusks are built upon this plan.

Details of Structure.— Mantle and Foot.— Typically the mantle is a paired structure, but in most groups the two halves unite in front and behind. This has its effect upon the shell, since where the lobes are separate, there are two halves or valves to the shell, but where united there is but a single (univalve) shell. Sometimes this univalve shell is a straight cone, but, while conical, it is usually coiled in a spiral, a part of the body extending toward the apex of the cone. As the animal increases in size the shells also increase in thickness and extent, the successive additions being usually recognizable on the external surface by lines of growth which run parallel to the free edge of the shell. When the edge of the mantle is provided with projections, lobes, etc., these cause ridges or protuberances on the surface of the shell. When the mantle is colored (striped or spotted), the color-pattern is reproduced in the shell, since pigment from the mantle is deposited along with the carbonate of lime. There is also a structure to the shell which needs mention. On the outside is usually a thin organic cuticle and beneath this two layers of carbonate of lime. Sometimes the inner of these layers consists of thin lamellæ parallel to the surface, the free edges of which produce diffraction spectra and thus give the inside of the shell an iridescent appearance — mother-of-pearl. See Pearl.

In the bivalve shell (see Bivalves) an elastic hinge ligament connects the two valves and causes them to open. The valves are closed by muscles (adductors), one or two in number, which extend across the body, from valve to valve. In the univalves there is always a muscle attached to the inside of the spiral, by the contraction of which the animal is retracted into the shell, the foot being the last part to disappear. In many groups the posterior dorsal part of the foot bears a horny or calcareous plate, the *operculum,* which closes the aperture of the shell like a door when the animal is retracted. On the other hand the shell is frequently greatly reduced and may become internal, as in the slugs and squid; or it may be entirely absent in the adult, as in the so-called naked mollusks (nudibranchs) although it is formed in the young and later lost.

Foot.—The foot, which projects from the mid-ventral surface of the body, shows great modifications, but is rarely lacking. Usually it forms a broad creeping disk on which the animal glides about, but in the *Scaphopoda,* as in most acephala, it is flattened from side to side and forms an efficient digging organ. In the cephalopods it becomes developed in part into the tube (siphon) connecting the mantle-cavity with the exterior; in part into the tentacles surrounding the head.

Digestive Organs.—The alimentary canal is typically a straight tube, but in most forms it becomes convoluted to increase the amount of digestive surface, while not infrequently it is so flexed on itself that mouth and vent, instead of being at opposite ends of the body, are in close proximity to each other. In all except the acephala the region of the mouth contains a peculiar structure, variously known as the lingual ribbon, radula, or odontophore. This consists of a strong band, having upon its upper surface numbers of rows of hard horny teeth—in fact, a flexible file; and of muscles adapted to draw it back and forth over any object to which the mouth may be applied. In this way the snails rasp away vegetation, or, as in the case of shells of other mollusks, are perforated in order that the soft parts may be reached and devoured. In the cone-shells a poison-gland is connected with the lingual ribbon. Wear at one end of the ribbon is made good by constant growth at the other end. Behind the gullet is a large saccular stomach, and closely connected with it are the ducts of the voluminous liver. The intestine is long, without enlargements, and in many acephala is remarkable for passing through the heart.

Circulation.—The heart lies dorsal to the digestive tract enclosed in a special sac, the pericardium, which is to be regarded as the sole representative of the true body-cavity or cœlom (see EMBRYOLOGY). In the heart two parts are always to be distinguished, a muscular ventricle which forces the blood through the arteries to all parts of the body, and one or two auricles which receive the blood as it comes from the gills and force it into the ventricle. As will be seen, the heart thus receives only oxidized or arterial blood. With the loss of the gill of one side the corresponding auricle disappears. When four gills are present as in the nautilus, there are four auricles. In the cephalopods branchial hearts, which force the blood through the gills, occur. At one time it was thought that some of the blood-vessels opened to the exterior, but this has been shown to be a mistake. The blood is usually yellowish or colorless, but occasionally is red, the color being due to the plasma and not to the contained corpuscles which resemble the leucocytes of the blood of man.

Gills.—As was mentioned above, there may be two kind of gills, the ctenidia and the secondary or adaptive gills, the latter occurring only in the gasteropoda. The ctenidia, which always occur in the angle between mantle and body-wall, consist, typically, of a series of filaments with blood-vessels in the interior, the filaments and the ridge from which they spring resembling somewhat the teeth and back of a comb, whence the name (Greek κτενός, comb). The ctenidia are typically paired, but in the nautilus there are two pairs, while in many gasteropods one ctenidium (that of the left side) is lost. The adaptive gills occur on various parts of the body, usually upon the back. In most land snails (*Pulmonata*) the gills entirely disappear and an air-breathing organ, the lung, is developed on the walls of the mantle cavity, the opening to it being usually on the right side of the body.

Nerves.—The nervous system was described above. It is only necessary to say that the ganglia may coalesce into a smaller number. There are usually present three pairs of sense organs, a pair of eyes connected with the cerebrum, a pair of so-called ears (really organs of equilibration) connected with the pedal ganglia, and a pair of organs of smell (osphradia) with the visceral ganglia. Of these the eyes are the least constant. In some cases they are replaced by numerous other eyes developed upon the back or upon the edges of the mantle.

Viscera.—The excretory organs are true nephridia, that is, coiled tubes opening at one end into the cœlom (pericardium), and at the other to the external world. They are also known as the organs of Bojanus. The reproductive organs are large. Usually the sexes are separate, but some, like the land-snails, are hermaphroditic. In no case is an asexual reproduction (fission, budding, etc.) known. A few bring forth living young. In many species a metamorphosis occurs during the development. In these a peculiar larva, known as the *veliger,* hatches from the egg, a larva which is closely similar to the "trochophore" larva of the annelids, a resemblance which points to a relationship between the two groups. The veliger receives its name from the "velum," a circle of cilia upon the dorsal side of the head above and in front of the mouth, by means of which the larva swims.

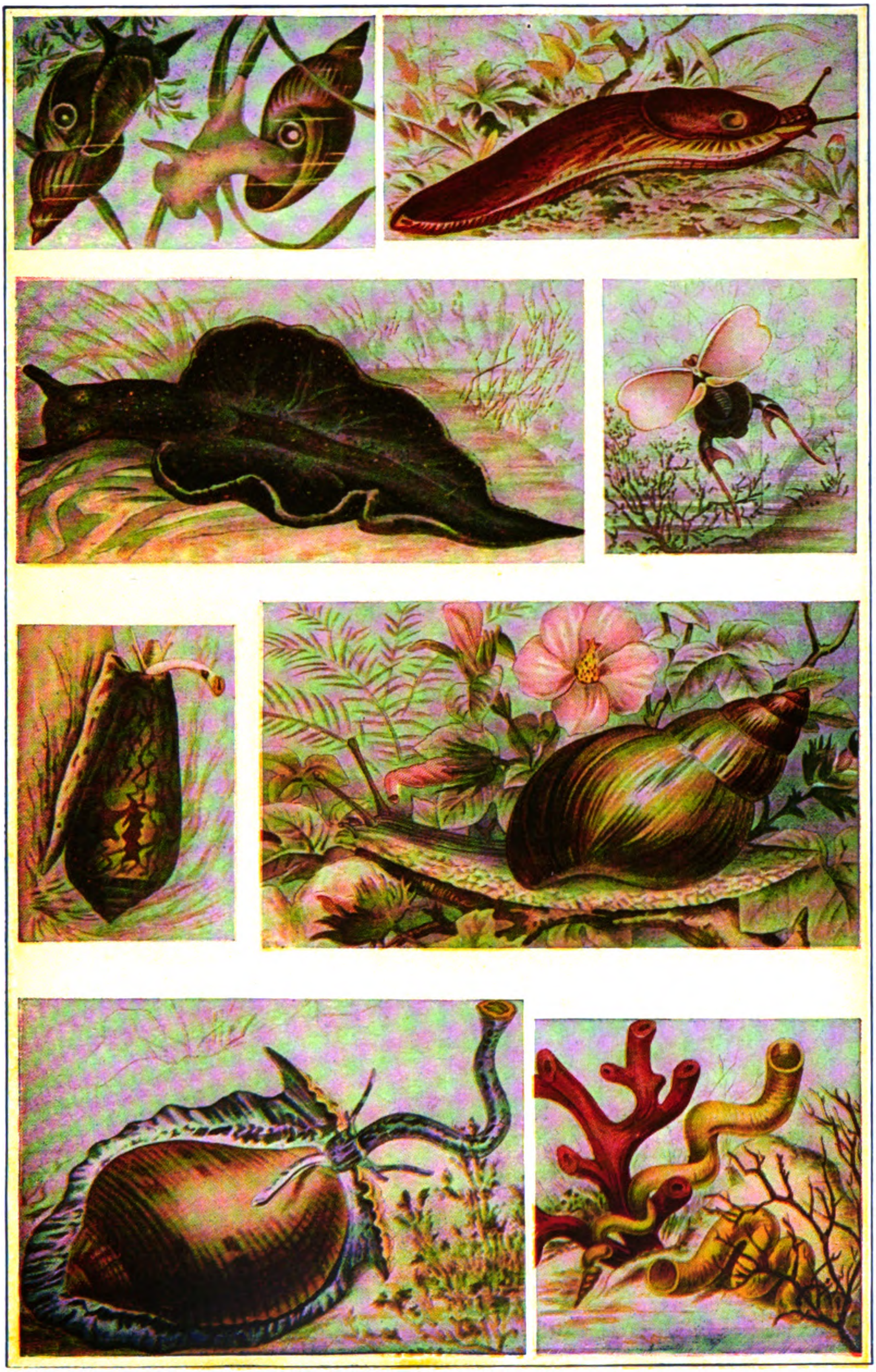
Classification.—The mollusks are divided into five classes, *Amphineura, Scaphopoda, Gasteropoda* and *Cephalopoda.*

Amphineura.—This, the most primitive group of mollusks contains the chitons (*Placophora*) and the *Solenogastres,* in both of which the body is markedly bilaterally symmetrical, while the nervous system is of a very low type. The chitons (q.v.) are flattened and covered with eight transverse plates of shell. The *Solenogastres* are worm-like shell-less forms of the deeper seas.

Pelecypoda or *Acephala.*—These are the mollusks which have the shell in two parts or "valves," no head, and the filaments of the gills more or less completely united into a couple of leaves (lamellæ) on either side of the body. See BIVALVES.

Scaphopoda.—This class includes a few marine forms of small size known as tooth-shells, from having shells shaped somewhat like an elephant's tusk, and open at both ends. See DENTALIUM.

Gasteropoda.—In these, the so-called snails,



1. Pond Snail (Limnea stagnalis). 2. Slug (Arion empiricum). 3. Green Sea-Slug (Elysia viridis). 4. Pteropod (Hyalea tridentata). 5. Cone-shell (Conus textilis). 6. Achatina (Achatina mauritanica). 7. Tun-shell (Dolium galea). 8. Wormshell (Vermetus gigas).

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the foot is usually a broad creeping disk and the head is well developed. See GASTEROPODA.

Cephalopoda.—In these the head is well marked off from the body, and the mantles of the two sides are united so that a single mantle cavity results, which is open to the exterior in front. See CEPHALOPODA.

Formerly two other orders of mollusks were recognized, the *Heterŏpoda* and the *Pteropoda,* but the heteropods are now known to be prosobranchs, the pteropods to be opisthobranchs, both being modified for a life on the surface of the sea.

Bibliography.—Hescheler, in Lang's 'Comparative Anatomy' (2d ed. 1896); Woodward, 'Manual of the Mollusca' (4th ed. 1880); Cooke, 'The Mollusca,' in Cambridge Natural History, Vol. III. (1895); Kingsley, 'Standard Natural History,' Vol. I. (1885). Tryon and Pilsbury began in 1896 a work in which they proposed to describe and figure every known species of mollusk. For mollusks of the United States consult writings of Gould, Binney, Morse, Tryon, Dall, Verrill, Bush, Stearns, etc.

Molluscoi'da, a group of animals formerly recognized by some naturalists, which included the *Brachicpoda,* the *Polyzoa,* and the *Tunicata.* On account of misinterpretations of structure these were once included in the *Mollusca,* and when removed from that group the name Molluscoida was given. Next the *Tunicata* were removed to the *Chordata,* and later the group *Molluscoida* was abandoned.

Mollwitz, mŏl-vĭts, Prussia, a village of Silesia, 25 miles southeast of Breslau, which gives its name to the battle fought to the east of the village 10 April 1741 between the Prussians under Frederick the Great and the Austrians under Marshal Neipperg. About 20,000 troops were engaged on each side, and the Austrians gained the first advantage in putting the Prussian cavalry to flight. The Prussian infantry, however, commanded by Marshal Schwerin, stood their ground for five hours and won the battle. The Prussians lost 5,500 men and the Austrians 5,340. The victory led to an alliance between France and Prussia, and to Austria ceding the province of Silesia to Frederick the following year, to dissolve the alliance.

Molly Maguires, an Irish secret society formed in 1843 to intimidate bailiffs or process-servers distraining for rent, or others impounding the cattle of those who were unable or unwilling to pay rent. A similar society was formed in 1877 in the mining districts of Pennsylvania. The members sought to effect their purpose by intimidation, carried in some cases to murder. Several were arrested, tried and executed, and the society was disbanded.

Mollymauk, a bird. See FULMAR.

Molmenti, Pompeo Gherardo, pŏm-pā'ō gā-rär'dō mōl-mān'tē, Italian author: b. Venice, Italy, 1852. He studied law and practised in Venice, but abandoned it to become professor of Italian literature at the Liceo Marco Foscarini. His literary work comprises critical essays, history of literature and art and also fiction, among which are: 'Impressioni letterarie' (1873); 'Storia di Venezia nella vita privata' (1880); 'Studi e ricerche di storia e d'arte' (1892); 'Antonio Fogazzaro' (1900).

Moloch, mō'lŏk, or **Molech** (Heb. *mōlekh,* king), called in Scripture an idol of the Ammonites, the fire-god of Phœnicia. His image was an iron statue, with a human body, the head of an ox, and extended arms. The statue is said to have been heated by a fire placed in the lower part, and children were placed as offerings in the arms. His cult was introduced into Judah, and Solomon built a temple to him on the Mount of Olives.

Moloch, a small Australian desert-lizard of the family Agamidæ, whose skin is covered with irregular plates bearing thorny pointed tubercles, spines and prickles all over the body, but especially well developed behind the head. Altogether its appearance is alarming, reminding one of a miniature of some armored saurian of the Mesozoic era. It is, however, quite harmless, subsists mainly on ants, and its formidable aspect, as in the case of the similar horned toad (q.v.), is wholly defensive in two ways — first as a real defense against being too readily seized and swallowed by enemies, especially serpents; and second, by exposing a very large and highly absorbent surface to whatever moisture the air may contain. Consult Saville-Kent, 'Naturalist in Australia' (1897).

Molokai, mō-lō-kī', Hawaii, an island of the group about 40 miles long and seven to nine miles broad. It is noted for the government settlement for lepers where Father Damien spent his noble life of self-sacrifice. See HAWAII; LEPROSY.

Molokan, mŏl-ō-kăn', plural **Molokani,** mol-ō-kä'nē, one of a sect in Russia who follow the laws of Moses regarding meat, forbid the use of images or the sign of the cross, and consider war unlawful. They derive their name from the quantity of milk-food eaten by them.

Molting, the change of skin or feathers, which occurs annually or periodically in insects, etc., and especially in birds. It is a process often perilous to the animal, being not infrequently attended by loss of life. In mammals it may be gradual, as when the pelage or hair is changed. Other examples are the annual shedding of the antlers of deer in spring, or the autumnal dropping of the horns of the prong-horn antelope.

Molting in Amphibia and Reptiles.—Here the entire skin is cast. The newt in early spring sheds its skin by detaching it from around the jaws, then pulling it back over the head, and the limbs. The toad in molting causes the old skin to split along the back, it then pulls it off as one would a coat by working the muscles of the back; it is detached by movements of the head from around the lips, face, eyes and mouth; the skin is more readily pulled off from the legs to the tips of the toes. The skin, as in salamanders, is a thin film, and it comes off in four pieces. Immediately after molting the creature is shy and active. Sharp describes the molting of the common striped snake (*Eutænia sirtalis*). One came out of the water in a vivarium, gliding on to the grassy sod; it then shrugged itself for a moment, when the skin parted at the jaws. The skin on the head, however, remained fixed, so that when the creature crawled out the old skin was inside out. The operation took less than one minute.

Molting in Birds.— The feathers may all be cast or only a part of them. Young birds molt several times before adult age. The passerine birds undergo a complete ecdysis after the breeding season is over (post-nuptial), when the worn-out plumage is restored; and they may also before the breeding time pass through an incomplete molt, when their wedding dress is put on. The process is so gradual as a rule that few birds, except the ducks, etc., are unable to fly, or go unprotected. The height of the molting season is in August, though the feathers drop out in nearly every month of the year. The complete molt is undergone in from a month to six weeks' time. Besides their feathers the pelican sheds a horny projection on the ridge of the bill, and the puffin and certain allied species shed the horny sheath of the bill, etc. For further information see PLUMAGE.

Molting in Crustacea and Insects.—The horsefoot crab (q.v.) frequently sheds its skin opening around the edge of the head; this is also the case with the fresh-water crustacean *Apus*. In the crayfish and lobster the skin splits open between the thorax and abdomen, and the animal draws itself out of the transverse rent thus formed. The skin is cast entire, while the chitinous lining of the mouth, throat, fore stomach and of the rectum is also shed. The process of exuviation in the crayfish has long been known to be aided by the outgrowth of little delicate papillæ called casting-hairs; these serve to loosen the old integument; recently Packard has discovered similar papillæ on the new or under-skin (hypodermis) of the lobster, and similar undergrowths aid the serpent in shedding its scaly epidermis.

In insects molting is frequent, especially in the larva stage, most caterpillars molting four or five times. The body moves convulsively and splits along the back, at the same time, casting hairs being usually absent, a molting fluid is poured out which serves to detach the old skin. The head is molted separately, the shell falling off by itself, then the body-skin is shuffled off, being pulled back toward the tail, and with the outer integuments all the lining of the digestive canal is shed (except that of the stomach and beginning of the intestine), and the lining of the spiracles, as well as the cuticle of all the hairs, and the spines.

Consult: Newton, 'Dictionary of Birds' (1893-6); Dwight, 'The Sequence of Plumage and Molts of the Passerine Birds' (Annals New York Academy of Sciences, Vol. XIII., 1900); Packard, 'Text-book of Entomology' (1898).

Moltke, Helmuth Karl Bernhard, hĕl'moot kärl bĕrn'härt mōlt'kĕ, COUNT VON, German soldier: b. Parchim, Mecklenburg-Schwerin, 26 Oct. 1800; d. Berlin 24 April 1891. In 1812 he was admitted as a cadet of the Royal Military Academy, Copenhagen. In 1818 he passed his examination for a commission as first of the candidates. Seeing little prospect of advancement, he entered the Prussian service in 1822, becoming 2d lieutenant. He then studied three years at the staff college, Berlin; in 1832 was appointed to the general staff; in 1833 became lieutenant, and in 1835 captain. He had already visited Italy, and he now went to Turkey, where he became military adviser of the sultan Mahmud. He took part in the Turkish expedition against Ibrahim Pasha in 1839, but his advice was disregarded, and he returned to Constantinople, and on Mahmud's death to Berlin, where he was again employed on the general staff. His experiences in Turkey led him to publish two valuable works: 'The Russo-Turkish Campaign of 1828-29 in European Turkey' (1835), and 'Letters on Affairs in Turkey in the Years 1835-39' (1841). After rising through the various army grades he was placed permanently at the head of the general staff of the army in 1859 with the rank of lieutenant-general. His labors in reorganizing the Prussian army were of immense value to Prussia and to Germany, and had a great influence on the general history of Europe. The defeat of Denmark in 1864 was largely owing to his genius for military operations, and the result of the greater war of 1866 against Austria is equally to be attributed to him. Then followed the Franco-German war of 1870, for which Moltke was entirely prepared, having foreseen for some years what was likely to happen, and having immediately after the Austrian war prepared for a campaign against France. The brilliant success which followed was in very large measure a personal triumph for Moltke. He passed his 70th birthday at Versailles, and was raised by the king of Prussia to the rank of count on receipt of news of the capitulation of Metz. On his return to Berlin he was made a field-marshal, received from parliament a grant of $225,000, was appointed for life a member of the Prussian upper house, and other honors were conferred upon him. He held the post of chief of the staff till after the accession of Emperor William II. in 1888, when he resigned on account of advanced age, but was made president of national defense. His 90th birthday was made the occasion of public demonstrations in his honor all over Germany. He was a man of great modesty and simplicity, kind and considerate to subordinates, and devoted, above all things, to duty. His military genius was compounded of boldness in design with minute care in execution. From his reticence it was wittily said that he was silent in seven languages. Besides the works already mentioned, Moltke wrote 'Letters' (1892), and the works of the general staff on the Italian war of 1866, and the Franco-German war of 1870-1 are largely from his pen. Consult the 'Essays, Speeches, and Memoirs' which appeared in 1893; also Pinkerton's English translation (1879) of Müller's 'Life.'

Moluccas, mō-lŭk'az, or **Spice Islands,** East Indies, three groups of islands in the Malayan or Indian Archipelago (q.v.), between Celebes and New Guinea, and the Philippines and Timor Archipelago. (1) The Ternate Islands, or Moluccas proper, consisting of Ternate, Gilolo, Batshian, Obi, Morti islands, and numerous islets. (2) The Amboyna Islands, including, besides Amboyna, which is the chief seat of government for the whole Moluccas, the islands of Ceram, Booroo, and other smaller islands. (3) The Banda Islands. They are nearly all mountainous, and some of them have peaks rising to a height of 7,000 feet or 8,000 feet, mostly volcanic; there are still several active volcanoes in the group, and earthquakes are of frequent occurrence. Cloves, nutmegs, mace and sago are exported to Europe; and birds'-nests, trepang, and shark-fins to China. The Moluccas, discovered in 1512, were alternately in the possession of the Spaniards, Portuguese, and Dutch. They were taken from the latter by the British in 1796, and in 1810, but in 1814 again given up to Holland, in whose possession they still remain. The general language on the coast is the Malay.

Molybdenite, a native sulphid of molybdenum, having the formula MoS_2, and crystallizing in tabular or hexagonal forms, probably belonging to the hexagonal system. It has a marked basal cleavage, and resembles some forms of mica. It is leaden-gray in color, with a metallic lustre, a specific gravity of about 4.7, and a hardness of from 1.0 to 1.5. It commonly occurs in granite, gneiss and other crystalline rocks. In the United States it is found in the New England States, and in New York, Pennsylvania, Colorado, and California. It also occurs in Canada, and crystals from one to two inches in diameter have been discovered in Renfrew County, Ontario.

Molybdenum, a metallic element whose compounds are somewhat widely diffused, though they rarely occur in any considerable quantity in any one place. Molybdenum is never found in the metallic state, but it occurs in a number of minerals, the most important of which is molybdenite (q.v.), the native sulphid. Molybdenite resembles galena in some respects, and owes its name to this fact, the word "molybdenite" being based upon the Latin name for galena. It was first clearly distinguished from galena by Scheele, in 1778, and in 1782 Hjelm obtained the element molybdenum in the metallic form. Molybdenum may be prepared by reducing the oxid by hydrogen, carbon, or potassium cyanide, as well as by various other methods. It is usually described as a silvery white metal, hard, but somewhat malleable. It has a specific gravity of about 8.6, and a specific heat of about 0.0659. Its melting point is higher than that of platinum. Molybdenum is not affected by air or moisture at ordinary temperatures, but oxidizes slowly when heated in air, and at high temperatures it burns, whether heated in air or in steam. Chemically, molybdenum behaves both as a metal and as a non-metal. It has the chemical symbol Mo, and an atomic weight of 96 if $O = 16$, or 95.3 if $H = 1$. It forms several oxids, of which the trioxid, MoO_3, is the most important. This is the oxid that is formed when the metal is burned in air, and it may also be prepared by roasting the native sulphid in air. The trioxid occurs native in small quantities, as "molybdenum ochre," or "molybdite." Metallic molybdenum combines directly with chlorine to form $MoCl_5$, and with bromine to form $MoBr_4$; but it does not combine directly with iodine. Unlike the other metals, molybdenum does not readily replace the hydrogen of acids to form definite salts, but its oxids dissolve in acids with the formation of compounds which have, as yet, been but little studied. The trioxid combines with water to form substances of the nature of acids, and which are, in fact, called "molybdic acids." These further combine with metallic bases to form an extensive series of compounds known as "molybdates." The compounds of molybdenum are of interest only to the chemist, as they have no extensive use in the arts. Ammonium molybdate, however, is used in the laboratory as a reagent for the detection of phosphoric acid, a yellow precipitate being thrown down when a nitric acid solution of ammonium molybdate is added to a solution containing a phosphate.

Molyneux, mŏl'ĭ-nooks, **William,** Irish philosopher: b. Dublin 17 April 1656; d. there 11 Oct. 1698. He was graduated from Trinity College, Dublin, entered the Middle Temple, London, became a student of applied mathematics and philosophy, was elected F. R. S. in 1685, and was elected to Parliament for Dublin University in 1692 and 1695. Besides his works on optics and philosophy, he wrote 'The Case of Ireland's Being Bound by Acts of Parliament in England' (1698).

Mombasa, mŏm-bä'sä, Africa, an island and town on the east coast, the town, the chief seaport and the seat of administration of British East Africa, being on the north side of the island, which is 3 miles long by 2½ miles wide, close to the coast, 150 miles north of Zanzibar, lat. 4° 3′ S. Here are an old Portuguese fort, a new European hospital, and the offices and workshops of the British East Africa Company. A short railway connects Mombasa with Kilindini, the naval coaling depot, on the other side of the island, where is the residence of the chief administrator of the company. Mombasa is also the terminus of a railway connecting with the Victoria Nyanza. Trade in (imports) piece-goods, brass and iron wire, beads, rice; and in (exports) ivory, gum, copal, copra, ochella weed, maize, and grain; carried on by natives of British India. Pop. about 25,000. Island and port are mentioned as early as 1331. It was visited by Vasco de Gama in 1497, held by the Portuguese from 1529 to 1698, and by the British from 1824 to 1826, but the British refused to accept cession of it. Soon after the Sultan of Muscat obtained possession of the town, which at his death fell to his son, the Sultan of Zanzibar. In 1888 the Imperial British East Africa Company received governing rights over it from the Sultan of Zanzibar, and since then it has passed definitely over to the possession of Britain, along with the huge territory on the mainland allotted to that country.

Mombert, mŏm'bĕrt, **Jacob Isidor,** American Episcopal clergyman and author: b. Cassel, Germany, 6 Nov. 1829. He was educated at Leipsic and Heidelberg, took orders in the English Church and in 1857 removed to Canada. He was assistant rector in Trinity Church, Quebec, 1857–59; rector of St. James, Lancaster, Pa., 1859–70, of St. John's, Dresden, 1870–6, of Christ Church, Jersey City, 1877–9, and of St. John's, Passaic, N. J., 1879–82. Since the last named date he has given his attention to literature. His writings include: 'Great Lives' (1886); 'Charles the Great' (1888); 'Handbook of English Versions of the Bible' (1890); 'Short History of the Crusades' (1890); 'Raphael's Sistine Madonna' (1895); etc.

Moment of a dynamical quantity is the importance of that quantity in regard to its dynamical effect relatively to a given point or axis. The moment of a force about a point is the product of its amount into its perpendiclar distance from the point. The tendency of the action of such a force is to cause rotation about an axis perpendicular to the plane passing through the point and containing the force. Thus, in the case of a pendulum, the effectiveness of the force in causing rotation is measured by the moment Wl — where W is the weight of the pendulum, and l is the distance of the line of action of the force W from the centre of rotation C, or the distance of the centre of mass G from the vertical line through C.

The term moment enters into several other phrases, all of which relate either directly or indirectly to rotation. Thus, there is the moment of momentum, or angular momentum, whose rate of change is the measure of the moment of the force producing the change. To obtain it for any given body rotating with angular speed ω about an axis, we first imagine the body broken up into a great many small portions of masses m_1, m_2, m_3, etc., at distances r_1, r_2, r_3, etc., from the axis, multiply the momentum ($mr\omega$) of each mass by its distance, and then take the sum of all these products. The angular speed ω being the same in every expression, the moment of momentum takes the form ω ($m_1r^2_1 + m_2r^2_2 +$, etc.), which it is usual to write in the symbolic form $\omega\Sigma mr^2$. The quantity Σmr^2, which is the sum of the products of each mass into the square of its distance from the axis, is called the moment of inertia about that axis. It is the factor in the moment of momentum, which depends upon the distribution of matter in the body. It enters into all questions of mechanics in which rotation is involved, from the spinning of a top or the action of an engine governor to the stability of a ship. By an obvious extension, the word moment is also used in such combinations as moment of a velocity and moment of an acceleration. Such phrases correspond to nothing truly dynamic, unless we regard velocity as meaning the momentum of unit mass, and acceleration as the rate of change of that momentum.

If the mass of every small portion of matter in a body be multiplied by the square of its perpendicular distance from a straight line, the sum of all such products is called the moment of inertia of the body about the line regarded as an axis. The radius of gyration of the body is the distance from the axis at which all the matter of the body might be concentrated without altering the moment of inertia. Thus, if I is the moment of inertia of the body, M its whole mass, and k its radius of gyration, $I = Mk^2$. We see that the moment of inertia of a body about a line is found by adding a great number of products of small masses and squares of distances; if the body can be defined mathematically as to shape, size, and density, finding its moment of inertia is a problem of the integral calculus.

Moment of Inertia. See MECHANICS.

Momentum, in mechanics and physics, the product of the mass and velocity of a body. Like velocity, momentum is usually regarded as having a definite direction, as well as a definite numerical magnitude. The momentum generated by a constant force acting upon a material particle for a definite length of time, is numerically equal to the product of the force by the time during which it acts. See MECHANICS.

Mommsen, mŏm'zĕn **(Christian Matthias) Theodor,** German scholar: b. Garding, Schleswig, 30 Nov. 1817; d. Charlottenburg, near Berlin, Prussia, 1 Nov. 1903. He was a student of jurisprudence and philology at the University of Kiel; took his Ph.D. in 1842; published with his brother Tycho and his friend Storm a volume of verse which was heartily condemned by the reviewers (1843); began more successfully his career as historian with the treatise 'De Collegiis et Sodalitiis Romanorum' (1843), commended for its thoroughness and a clarity of style new to German works of this kind; and in 1844–7 was in France and Italy under commission of the Berlin Academy, collating manuscripts and inscriptions. On his return he edited for a short while the *Schleswig-Holsteinische Zeitung,* and in 1848 became professor of Roman law at Leipsic. He entered politics as an advocate of constitutional progress, was arrested for inciting to revolt, and though acquitted by the courts was deprived of his chair. From that time he was an eager if not invariably judicious disputant in many political controversies. He was appointed to the professorship of Roman law at Zürich in 1852, at Breslau in 1854; and from 1858 until his death was professor of ancient history in the University of Berlin. In 1873 he was elected perpetual secretary of the Berlin Academy; but this post he resigned in 1895. For ten years (1873–82) he was a Liberal member of the lower house of the Prussian parliament, where he bitterly attacked Bismarck's domestic policy. In an election speech at Charlottenburg in 1882 he characterized the Iron Chancellor's tariff measures as a «Politik von Schwindel.» Such boldness might not go unrebuked, and Mommsen was brought to trial for slander. His acquittal by both a lower and an appeals court was one of his great triumphs. He sternly advised the Teuton element in Austria in the struggle with the Czechs; made some caustic observations in a 'North American Review' article on British treatment of minor nations; to the last was quite as belligerent as ever.

But he was only incidentally the politician. He was pre-eminently what Freeman called «the greatest scholar of our times, well nigh the greatest scholar of all times» ('Methods of Historical Study'). He was distinguished as an epigraphist, historian, jurist, numismatist, and philologian. None in the 19th century, which he almost spanned, has, as Freeman goes on to say, «taken in so wide a range of subjects, all brought with the happiest effect to bear upon and to support one another." To the educated reader at large he will probably continue to be best known for his 'Römische Geschichte' (3 vols. 1854–6; 8th ed. 1889), to the battle of Thapsus; together with Vol. V. on the provinces from Cæsar to Diocletian (1885). Volume IV., on imperial Rome, was unfinished at his death. There are English renderings by W. P. Dickson (Vols. I.–III. 1862–6; Vol. V. 1886). This work opened a new epoch in historiography. Though written with great spontaneity, without even references to original sources, it was based on unrivaled knowledge, and presented its material with extraordinary clearness and at times with brilliancy. It is of course somewhat dogmatic, is certainly unfair to Cicero, and has been blamed, by Freeman among several, for undue regard of mere power and success. To scholars Mommsen is above all the editor of the great 'Corpus Inscriptionum Latinarum' (1863 et seq.; Vols. I., III., VIII., IX., by himself; others under his immediate supervision). Every inscription of this monumental collection was taken down from the original. The errors and falsities of predecessors were cleared away, and a scientific foundation was supplied for the study of Roman antiquities. Mommsen's preface to the series is said to be thought by critics one of the finest specimens of Latin prose written in modern times. For a complete list of his writings, Zangemeister's 'Mommsen als Schriftsteller' (1887) should be consulted. Mention may be made of 'Römisches Münzwesen' (1850), 'Römische Chronologie' (1859) and 'Römisches Staatsrecht' (1871–88). All are standard, but the last, particularly, by the breadth and completeness of his exposition of the Roman constitution, places Mommsen among the foremost of constitutional writers. He also edited the 'Res Gestæ Divi Augusti ex Monumentis Ancyrano et Apolliensi' (1865; new ed. 1883); the 'Digesta' in Vol. I. of the 'Corpus Juris Civilis,' 6th ed. 1893), and many other publications. His library, when partially burned in 1880, was replenished by gifts from foreign scholars. In 1902 he was awarded the Nobel prize in literature.

Momor'dica, a genus of plants of the gourd family, remarkable for their strangely marked seeds. Two or three species are cultivated in the United States as ornamental plants, one of which (*M. charantia*) produces a food for the Chinese in the pulp about the sculptured seeds; another Oriental food, the golkokra of India, is the fruit of *M. cochinchinensis;* and the balsam-apple (*M. balsamina*) which furnishes a healing principle which is infused in oil to form a liniment highly esteemed in the Levant.

Momotombo, mō-mō-tōm'bō, Nicaragua, an active volcano rising from the northwestern shore of Lake Managua. It is 6,121 feet high; its last notable eruption was in 1852.

Mompos, mōm-pōs', or **Mompox,** mōm'-pōh, Colombia, a town of the province of Bolivar on an island formed by the Magdalena. The streets, which extend parallel to the river, are well laid out, but the houses are badly built. Mompox is a depot of foreign goods destined for consumption in the valley of the Magdalena; but the changes in the river's course rendering it unnavigable have seriously injured its prosperity. Pop. 10,000.

Mo'mus, in Greek mythology, the god of satire and mirth. He is generally represented raising a mask from his face and holding a small figure in his hand. His mother was Nyx, the goddess of night.

Mona, mō'na, (1) a West Indian islet belonging to the United States since 1898. It has 42 miles east of Porto Rico, in the middle of Mona Passage, to which it gives its name; area, nearly 10,000 acres. It is a coral formation. The general level is about 60 feet above the sea-level, with a range of hills on the east side of the island, running from north to south, the highest peak of which is 175 feet above the water. The island is well watered and well drained, has a luxuriant vegetation and all kinds of tropical fruits grow in profusion. It is the nesting place of thousands of green turtles, and the waters teem with the finest varieties of fish. The only residents belong to the lighthouse establishment; (2) the ancient name mentioned by Tacitus for the island of Anglesey (q.v.), Wales, also applied by other ancient writers to the Isle of Man.

Mona, a West African monkey (*Cercopithecus mona*), remarkable for its brilliant coloration, the head being olive-yellow, with a black stripe on the forehead; yellowish whiskers and a purple face. The back is chestnut-brown, and there is a white spot on each side near the root of the tail, which is black. It is constantly seen in menageries.

Monachism, or **Monasticism,** is a state of life in retirement from the world adopted for motives of religion. It is not peculiar to Christianity, for in many religions, as that of Israel, and in those of India, China and Tibet, the same motive has led men to withdraw themselves wholly or in part from converse with worldy society and to seek in seclusion and retirement opportunity to lead a purer or higher life. The Nazarites, the Rechabites, the Essenes, the Therapeutæ were separatists from society in a greater or less degree, and in this respect were the precursors of the ascetæ of the earliest Christian age and of the hermits or anachoretæ and the cœnobites of the third and fourth centuries.

In the middle of the 3d century, during the persecution of the Christians by Decius, Paul of Thebes in Egypt (St. Paul the first hermit), withdrew to a wilderness, and during the remainder of his long life lived in absolute solitude in a cavern of a mountain, deriving his food and his vesture from a neighboring grove of palm trees. Many others fleeing from persecution or from the contagion of a profoundly corrupt society, flocked to the wildernesses of the Nile country; among them was Antony (Saint Antony), who after many years of the strictly solitary life of an anachorete was in a manner compelled by circumstances to adopt the cœnobite rule. He was by choice an anachorete like St. Paul the Hermit, but the fame of his virtues and his miracles brought to his cell in a remote wilderness many who desired to devote themselves to the service of God under such a master; and as he could not refuse their prayer he became, in fact if not in name, the Father or Abbot of a pretty numerous cœnobium; hence he is called the Father of Monachism, that is, of the life-in-common of those who retire from the world for reasons of religion; they retain the title of monk, *monachus* (a solitary), though since St. Antony's day they are no longer solitaries but cœnobites.

Antony's cœnobites occupied each a separate hut or a separate grotto; but St. Pachomius, a contemporary of Antony, introduced a further development of the community life. The cells or huts were now to hold three brethren; meals were eaten in common; the labor of the monks was regulated; the brethren were graded according to their spiritual proficiency; the community was presided over by an abbot, with inferior officers; in addition to the primitive industries of petty agriculture, basket-making and mat-weaving, the monks practised the trade of the smith, of the tanner, etc.; there were daily assemblies of the community for prayer and conference. When St. Pachomius died, about the middle of the 4th century, 7,000 monks were subject to his rule.

From Egypt monachism soon spread into Syria, Palestine, Mesopotamia, Asia Minor and Armenia.

The introduction of monachism in the Western countries of the Roman Empire dates from a little after the middle of the 4th century when a few small communities of monks, under the Pachomian rule, were founded at Rome and in Northern Italy. Later, when the rule of St. Basil had been translated into Latin, communities of Basilian monks sprang up in Southern Italy. Saints Jerome, Augustine and Ambrose were zealous promoters of monachism in Italy and Africa, St. Martin of Tours in Gaul; when St. Martin died (397) his body was followed to the tomb by 2,000 monks.

Whether under the Pachomian or the Basilian rule or under modifications of these, monastic establishments multiplied rapidly in the West. But the disorder which attended the decline of the Western Empire and the barbarian invasions, had its effects upon monachism, and the monastery exhibited the same anarchy as did civil society.

Early in the 6th century Benedict of Nursia, who had already led for three years the life of a strict recluse in a cave at Subiaco, about forty miles distant from Rome, was chosen by the monks of a monastery in the same place as their abbot; but very soon, his new subjects having deposed him, he returned to his solitude and commenced that reform of Latin monachism which made his name illustrious. He gave to his monks a rule which, variously amended and modified, has been the law of the monastic life of Western Europe ever since. In its preamble Benedict recognizes two and only two legitimate classes of monks — cœnobites and anachoretes — those who lead the life in common and those who live in solitude — usually now called hermits.

Two other classes he names, but only for condemnation, namely, sarabaites — professing monks who live two or three together without any superior or any fixed rule; and *gyrovagi* or *circulatores*, tramps, wandering beggars who wear the cloak of a religious profession. To do away with these scandals of the monastic life, Benedict's rule requires that the postulant for admission to a monastery shall take in addition to the usual monastic vows of poverty, chastity and obedience, a further vow that he will remain all his days in the community in which he makes his profession, and never be absent from the monastery save by leave of his superior.

Besides monasteries for men Benedict instituted also monasteries of women, and the first abbess of a community of Benedictine nuns was his sister Scholastica.

The Benedictine order was for a long time a powerful agency in the civilization and christianization of the barbarian nations of Europe. Wherever a Benedictine foundation was made there the face of the country was quickly changed: forests were cleared, marshes drained, the arts of husbandry developed, peace and civil order maintained, science and learning fostered, schools, hospitals and refuges established.

Monastic institutions founded in Britain, France, Switzerland, Italy and Germany by Celtic monks prior to Benedict's reform conformed to the Benedictine rule. The Carthusian order, founded in the end of the 11th century, was a reversion to the anachoretic type of monachism — the solitary or eremitical instead of the cœnobitic life. In the same century arose the order of the Camaldoli, another order of hermits.

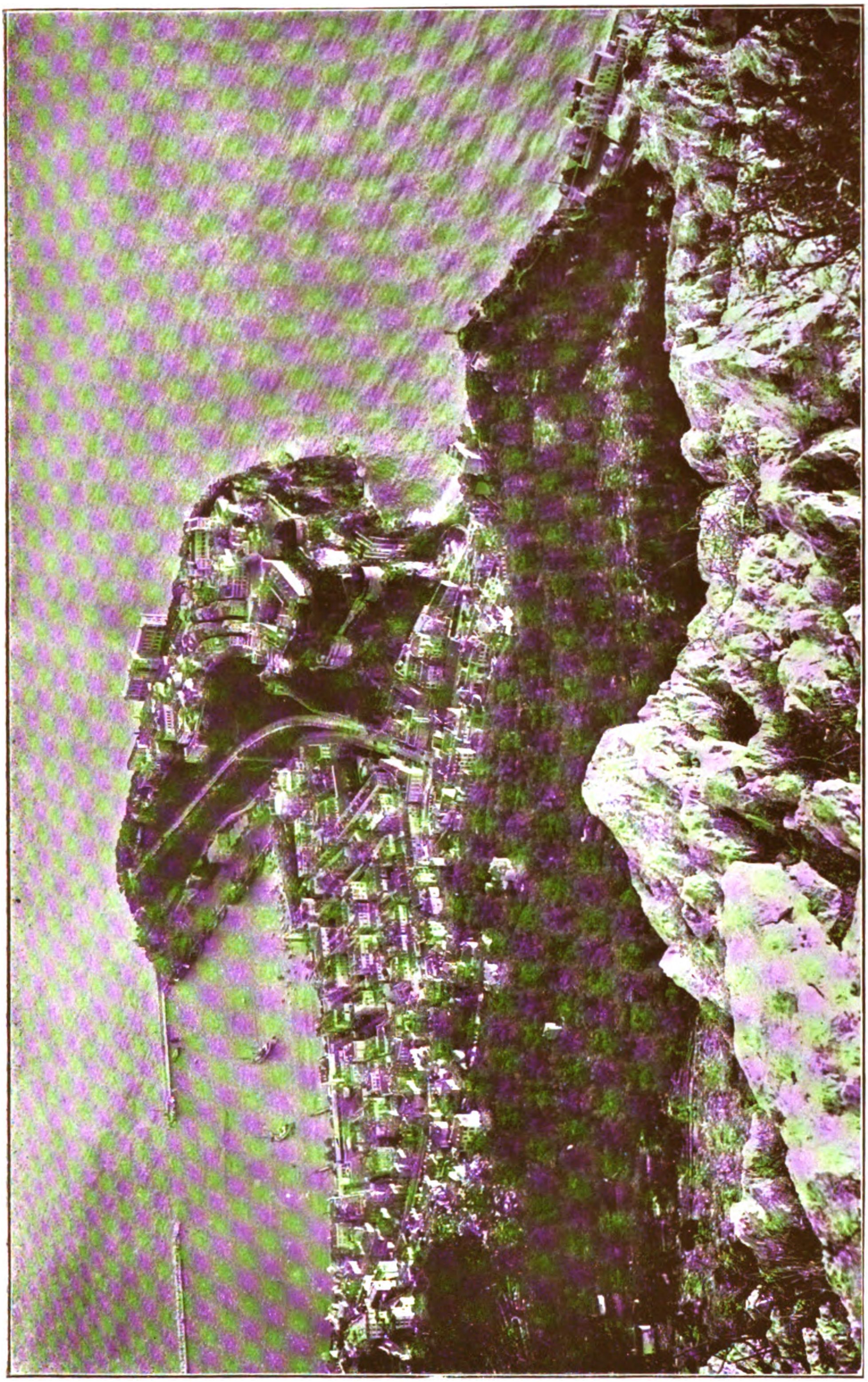
The beginning of the 12th century saw the rise of that singular development of monachism, the knightly orders, the members of which besides the usual three vows of the monk took a fourth vow, of making war on the infidels for the defense of Christendom. The Knights Hospitallers were originally a religious society bound by vow to harbor in health and in disease pilgrims visiting the holy places in Jerusalem; their house in the holy city was a "hospital" or guest-house. The full title of the Knights Templars is "pauperes commilitones Christi templique Salomonis" — poor knights-companions of Christ and of Solomon's temple. Another military order contemporary with these was the Teutonic order. History records the titles of over ninety military orders or of bodies styling themselves so.

The chronic state of war between Christendom and the Mohammedan power led to the institution of the order of Trinitarians and that of Our Lady of Mercy. The mission of these orders was the redemption out of slavery among the Mohammedans of Christian captives. Bearing the alms and gifts contributed by the charity of Europe, the members of those orders visited the Mohammedan countries on the Mediterranean and procured the liberation of the enslaved Christian captives and restored them to their native countries. The Trinitarians had at one time 250 houses; the Christians redeemed by them, from first to last, numbered over 30,000. The order of Mercy was at first a military order, but in 1218 it put off its military character, and devoted itself wholly to the charitable work of redeeming the captives.

There seemed to be now a sufficiency of religious orders to satisfy all needs. But at this very time, the beginning of the 13th century, two new orders were instituted — and that by Pope Innocent III., who in the Lateran Council had procured the enactment of a decree forbidding the creation of new monastic orders. The new institutes were the order of the Friars Minor (Franciscans) and that of the Friars Preachers (Dominicans); and to these very soon were added two more — the order of Austin Friars (Augustinians) and that of the Carmelites. These are the four mendicant orders, so called because by their rule they renounce all property and all endowments and subsist on the alms of the faithful.

The membership and the establishments of these mendicant orders increased with astonishing rapidity throughout the whole of Europe. Dominican and Franciscan friars were soon the great lights of the theological schools — Albertus Magnus, the Doctor Universalis, as he was styled by his contemporaries, and Thomas of Aquinum, the Angelic Doctor, being the foremost of the Dominican divines, and Duns Scotus, the Doctor Subtilis, and Roger Bacon holding the first rank among the Franciscans. The friars were also effective missionaries both

MONACO.



THE HARBOR OF MONACO,
Showing the New Oceanographic Museum at the Tip of the Mainland.

Univ. Library, UC Santa Cruz 2001

among the poor and the rural populations at home and among the heathen and the infidels.

The Company of Jesus is the latest of the great religious orders; it was founded in 1534 and its mission was to resist the onward march of Protestantism, directly by combating the Protestant assault on the Catholic Church and by instructing the Catholic populations in the grounds of their religious faith and practice; indirectly by organizing a system of higher education for Catholic youth, and offering educational advantages superior to those afforded by Protestant universities and academies. The Company of Jesus took also as its special field of labor the evangelization of the heathen.

Nearly all the later religious orders and institutes have had for their object the Christian education of the young, the reformation of the fallen, or the relief of the poor and distressed; among the orders established for these ends are those of the Nuns of the Good Shepherd, the Sisters of Charity and of Mercy, the Brothers of the Christian Schools, and numerous other congregations.

The Reformation was hostile to monasticism, and in those countries where it obtained, the monasteries were suppressed and the monastic life disappeared. Henry VIII. seized upon the monastic properties throughout his realm and applied them for his own religious or secular purposes. In Protestant Germany, Scandinavia and Switzerland, the monastic institution ceased to exist shortly after the triumph of the Reformation. In the 18th century a concertedly hostile movement against monasticism took shape in all the countries under Bourbon rule. The governments of Portugal, France, Spain, Sicily and some of the Italian principalities expelled the Jesuits and brought such political pressure to bear upon the Papacy that Clement XIV. reluctantly signed the decree suppressing that famous Society in 1773. Pius VII. restored the Society in 1814. During the latter half of the 19th century a recrudescence of hostility on the part of the governments of the Latin countries against the religious orders manifested itself. In Spain, France, Italy, Mexico and some of the South American republics expulsion for some orders and hampering restrictions upon freedom for others have contributed to retard their growth and development. The reasons usually alleged for these coercive measures by these governments are political and economic, the merits of which it would be out of place to discuss here. At the present time the French government has aimed a deadly blow at monasticism in that country in its Associations Law. Germany admits all the religious orders except the Jesuits. In Great Britain full freedom is now given in the establishment and development of monastic institutions. In the United States, where there are absolutely no legislative restrictions upon the freedom of monastic life, the religious orders are in a flourishing condition. In this country there are 8,000 male and 45,000 female members of religious orders.

In the Church of England within the last fifty years there has been a revival of the monastic idea with no inconsiderable results. Dr. John Mason Neale, and Canon Carter promoted the establishment of sisterhoods (of St. Margaret and of St. John Baptist), in which life vows of poverty, chastity and obedience were taken, and a mother house of the Sisters of St. John Baptist was founded in New York as a branch of the central house in England. There is also the Protestant Episcopal sisterhood of St. Mary and many others in the United States. Among the male orders of Protestant monasticism must be mentioned the Cowley Fathers, founded by Dr. Benson, and in the United States the Order of the Holy Cross, a preaching order founded by J. O. Huntingdon, son of Bishop Huntingdon. An order of monks was also founded by Rev. Joseph Leycester Lyne in 1870 at Llanthony Abbey, Wales, and the strict rule of St. Benedict was adopted. It is no exaggeration to say that the monastic movement is now flourishing, both in the Church of England and in its daughter church, the Protestant Episcopal Church in the United States.

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JOSEPH FITZGERALD,
Author of 'Word and Phrase.'

Monaco, mŏn'ă-kō, the smallest independent European principality, bordering on the Mediterranean, 9 miles east of Nice, and enclosed on its land borders by the French department Alpes-Maritimes. It had an area of 53 square miles until 1861 when the Prince of Monaco ceded Mentone and Roccabruna to France for 4,000,000 francs. The principality has since been confined to the towns of Monaco, Condamine, and Monte Carlo with the surrounding districts, having an area of about 8 square miles, and a population of about 17,000. In the 10th century the Emperor Otho I. conferred Monaco on a prince of the house of Grimaldi, a scion of which (through a female branch) still continues to rule. The expenses of government, municipal and other, are defrayed by a joint-stock company, which carries on the famous gaming establishment at Monte Carlo, and which also pays a handsome yearly sum to the Prince for the concession. The capital, Monaco (pop. 3,291), situated on a lofty promontory overlooking the sea, in the midst of olive, orange, and lemon groves, is a renowned watering-place. Here are the palace and cathedral. There are numerous hotels and an English church at Monaco.

Mon'ad, in biology. See INFUSORIA.

Monadnock, mō-năd'nŏk, New Hampshire, a mountain near the southwest corner of the State, in Cheshire County, 10 miles southeast of Keene. The base covers an area of five miles by three, and the altitude is 3,186 feet above the level of the sea; it is composed of slate, talc, and mica. The summit commands a fine view, and it is a conspicuous landmark, visible even from the dome of the state house at Boston.

Monagas, José Tadeo, hō-sā' tä-dā'ō mō-nä'gäs, Venezuelan soldier: b. Maturin, Venezuela, 28 Oct. 1784; d. El Valle, Venezuela, 18 Nov. 1868. He served in the war of 1813–21 under Bolivar and rose to the rank of brigadier-general and was afterward engaged in various military measures until 1830 when he became a member of congress. Bolivar's death occurring in 1831 Monagas retired but was soon called to the command of the Orient. In 1835 he supported a revolution but made his peace with the government a few months later and in 1847 was elected president. His administration was at first marked by liberal measures, but his policy becoming arbitrary he was deserted by his party, whereupon he abolished congress and assumed a dictatorship. He defeated Paez who lead a revolutionary movement against him and disregarding his treaty, imprisoned him, and in 1851 took command of the army, the presidency being held by his brother. In 1855 he was re-elected, but a revolution followed and he was compelled to leave the country in 1858, after resigning the presidency. He returned in 1864 and in 1868 headed a successful revolution and was elected president by Congress, but died before being installed in the office.

Monaghan, mŏn'ạ-gạn, **John James,** American Roman Catholic prelate: b. Sumter, S. C., 23 May 1856. He was educated at St. Charles College, Md., pursued a theological course at St. Mary's Seminary, Baltimore, and was ordained to the priesthood in 1880. He held several pastorates in Charleston, S. C., and elsewhere, was chancellor of the diocese 1887–8, and assistant to the vicar-general at St. Patrick's, Charleston 1888–97. In May of the last named year he was consecrated bishop of Wilmington.

Monal, or **Monaul,** a name among Anglo-Indian sportsmen for any of several Himalayan pheasants, especially the gorgeous species of the crested genus *Lophopterus*. See IMPEYAN PHEASANT.

Monamine, in chemistry, an amine that is derived by replacing one or more of the hydrogen atoms of a single molecule of ammonia by an equal number of monovalent organic radicals. Amines that are derived by joining two, three, or four molecules of ammonia, through the partial replacement of their hydrogen by a single polyvalent radical, are called di-, tri-, and tetra- amines respectively; and the monamines are known as primary, secondary or tertiary, according as one, two or three of the hydrogen atoms of the ammonia molecule have been replaced. See AMINE and AMIDE.

Monarch Butterfly. See DANAIS; MILKWEED BUTTERFLY.

Monar'chians, a sect in the early church who asserted the oneness and singleness of the divine person, as at variance with the orthodox doctrine of the Trinity, three Persons and one God. The supremacy of God the Father, they maintained, was impugned by those who said that the Son was coeternal. If there was but one God, they taught, and Jesus Christ was God incarnate, then the Father must have suffered and died. Hence they were called Patripassians (q.v.). Christ was therefore merely one form or mode of the Father's manifestation; and the Father might also manifest himself through the Holy Spirit. This theory was called Modalism or Monarchical Modalism and its teachers Modalists. Praxeas (q.v.), a Christian of Asia, brought this doctrine to Carthage in the 2d century and was controverted by Tertullian (q.v.). The most noted of Patripassians was Sabellius (q.v.), and Modalism was widely known as Sabellianism in both the Eastern and Western Churches. There were other Monarchians called Dynamic Monarchians who taught that Christ became Son of God dynamically, by having certain powers bestowed upon him in his adoption by baptism. Pope Victor I. in the 2d century excommunicated Theodotus the Tanner who professed this theory, and an Asiatic synod (268) condemned and anathematized the view as taught by the noted Paul of Samosata (q.v.), the minister of Zenobia (q.v.), queen of Palmyra. Monarchianism was revived in the 16th century by Socinus, and is in some form or other the essential basis of certain Unitarian creeds.

Monarchy, a form of government in which the supreme power is vested in a single ruler, and which is absolute, limited, or constitutional, hereditary, or elective.

Mon'astery. See MONACHISM.

Monastery, The, a novel by Sir Walter Scott, published in 1820, the scene of which is Scotland in the 16th century. In this tale Scott for the first time introduces a supernatural element, as in the mysterious appearances of the 'White Lady of Arenel,' and for this reason the book was never as popular with English readers as his other tales. Its sequel, 'The Abbot,' appeared the same year.

Monas'ticism. See MONACHISM.

Monastir, mō-näs-tēr', or **Bitolia,** bē-tō'lĭ-ạ, Turkey, a city and vilayet of Macedonia (q.v.). The city, 86 miles by rail northwest of Saloniki; is built at the west edge of a plain, in a recess formed by two lofty mountains, and is intersected by a river, crossed by numerous bridges. The streets are wide and well-paved; the houses neat and clean; the mosques and minarets, picturesque; and the bazars handsome. It is an important central situation for all military operations relating to this part of Turkey. The majority of the inhabitants are Greeks and Bulgarians, the Turkish residents being mostly soldiers or officials. It carries on a large trade with Constantinople, Saloniki, Vienna, and Trieste. Pop. about 40,000.

The vilayet has an area of 10,690 square miles; pop. about 850,000.

Monazite (Greek, "solitary," in allusion to its rare occurrence), a native phosphate of the metals of the cerium group, often also containing more or less thorium silicate. It is reddish or brownish in color, with a resinous lustre, and crystallizes in the monoclinic system, though it also occurs in massive and granular forms. It is commonly translucent and brittle, with a hardness of from 5 to 5.5, and a specific gravity of about 5.0 to 5.2. It is found at Norwich, Conn., and also in the Ural district, as well as in other parts of the world. The chief commercial supply, however, comes from North Carolina and from certain parts of Brazil. In these regions monazite is a constituent of the granitic rocks, and is obtained by washing the gravels and sand that have been formed by the disintegration of those rocks. The Brazilian output has been controlled by a German syndicate since 1902, and practically all of it now goes to Europe. The monazite produced in the United States comes chiefly from Burke and Cleveland counties, North Carolina. The total production of the mineral in this country in 1901 was 748,736 pounds. Monazite owes its industrial importance to the cerium and thorium that it contains, the former being utilized for the preparation of cerium oxalate, which is used in medicine and in the arts, while the thorium is employed in the manufacture of mantles for incandescent gas-lighting.

Monbod'do, James Burnett, Lord, Scottish judge and philosopher: b. Monboddo, Kincardineshire, October (or November) 1714; d. Edinburgh 26 May 1799. He was educated at Aberdeen, Edinburgh, and Groningen, soon became a leading member of the Scotch bar, and in 1767 became ordinary lord of session. As a judge he was able and lucid. His literary fame rests on his work 'On the Origin and Progress of Language' (1773–92), in which he held that language was a human invention traceable west from Asia, and his 'Ancient Metaphysics' (1779–99), a work held in contempt by his contemporaries, but now recognized as important in the history of philosophy, because of its praise of Greek philosophy, thus approaching Neo Kantianism, and for its treatment of man as one of the animals, suggesting in this and other respects Darwinism.

Moncheur, môṅ-shėr, **Ludovic,** Baron, Belgian diplomat: b. Brussels 12 May 1857. He was educated at Louvain, entered the diplomatic corps, became attaché to the Belgian legation at The Hague in 1883; held posts in the legations to Vienna (1885), Berlin (1887), Rome (1892); and became minister to Mexico in 1898; married the daughter of Powell Clayton, U. S. minister to Mexico; and in 1901 became minister to the United States. He has written on the geography of Mexico and is a member of the Antwerp Geographical Society.

Monclova, mōn-klō'vä, Mexico, a town of Coahuila, the terminus of a branch line of the Mexican International railroad to Cuatro Cienegas, 100 miles northwest of Saltillo. Monclova dates from the 17th century and was formerly the capital of the dual state of Coahuila and Texas. It has railroad works, and a trade in the agricultural produce of the region. Pop. 15,000.

Moncrieff, mŏn-krēf', Sir **Alexander,** British ordnance expert, inventor of the disappearing gun system: b. Scotland 17 April 1829. He was educated at Edinburgh and Aberdeen; apprenticed to a civil engineer; served in the Scottish Royal Artillery; during the Crimean war planned the Moncrieff ordnance system, also called the protected barbette, or the disappearing system. The important point in this system is that the recoil of the gun is utilized to drop it out of sight after firing and to raise it again when necessary, a contrivance which did away with the cumbrous and expensive system of steel-plated forts. It substituted for them the simple, inexpensive Moncrieff pits, mere slight excavations for the masking of coast batteries.

Moncrieff, Robert Hope, "Ascott R. Hope," British author: b. Edinburgh 1846. He began to study for the bar but forsook law for literature and under various pseudonyms, but mainly that of "Ascott R. Hope," has published more than a hundred books of fiction and other works. Among them are: 'Hero and Heroine'; 'Homespun Stories'; 'Ready Made Romance'; 'Tales for Toby'; 'Album of Adventure'; 'Wigwam and Warpath.'

Moncton, mŭnk'tŏn, Canada, a city and port of entry in Westmoreland County, New Brunswick, at the head of navigation of the Petitcodiac River, a tidal stream entering the Bay of Fundy; and on the Intercolonial railway, 86 miles northeast of Saint John, and 185 miles northwest of Halifax. It has a good harbor and an extensive trade in lumber and produce. The tide in the Petitcodiac estuary is one of the most remarkable in the world, coming in with a bore from 4 to 6 feet high and rising to a maximum height of 70 feet. The offices and chief workshops of the Intercolonial railway are here, and there are manufactures of sugar, cotton and woolen goods, leather, woodenware, tobacco, etc.

Mond, mŏnd, **Ludwig,** English manufacturing chemist: b. Cassel, Germany, 7 March 1839; d. 11 Dec. 1909. He was educated at the Cassel Polytechnic and the Universities of Marburg and Heidelberg; went to England in 1862, to enter the employ of the Leblanc soda works, where he introduced his method of recovering sulphur from alkali waste; in 1873 introduced the Solvay process of manufacturing ammonia soda, into England; and continually improved this process. He invented a means of manufacturing chlorine as a by-product of the ammonia soda process, and devised new gas-batteries, new processes for manufacturing nickel, based upon his discovery of nickel carbonyl, and a new method of producing gas for power and heating, ammonia being a by-product. In 1896 Mond endowed the Davy-Faraday Research Laboratory at the Royal Institution.

Mon'day (*moon* and *day;* Saxon, *Monandæg;* German, *Montag;* Latin, *lunæ dies*), the second day of the week, formerly sacred to the moon. See Calendar.

Mondovi, mŏn-dō-vē', Italy, an episcopal city in the province of Cuneo, 58 miles by rail south of Turin. Its chief building is the 15th century cathedral of San Donato. Silk, cloth, paper, pottery, machinery, etc., are among its manufactures, and it has a school of industrial arts and handicrafts. Near the city the Sardinians were totally defeated by Napoleon 22 April 1796.

Mo'ner, the simplest form of protozoan, and regarded as the simplest known animal organism. It was made by Hæckel the type of a separate group (*Monera*), characterized chiefly by lack of nucleus, but further investigation showed that the moners had no just right to this distinction, and they are included among the rhizopods in the order *Lobosa.* One of the forms most frequently met is *Protoamœba.* Consult: Haeckel, 'History of Creation' (1876); Parker and Haswell, 'Text-book of Zoology' (1897).

Monet, Claude, klōd mō-nā, French impressionist painter, leader of that school: b. Paris 14 Nov. 1840. He was reared in Havre. To coax him out of his love for art he was allowed to enter the army; but his first glimpses of Algiers made him more the artist than before. At 22 he resigned from the army; began to study art; worked under Gleyre in Paris; soon broke with his master, who would not allow him to draw what he saw; and became a plein-airist and for the time a follower of Boudin, a French marine painter. The Salon was rigidly closed to his pictures, and as he grew in power he soon lost all traces of academic influence, even that of the Barbizon School, and became the first

of the impressionists. He painted a few interiors, but was more at home in his landscapes. In these he made the most conscientious effort to reproduce exactly light and atmosphere, working on one canvas day after day at the same hour for a short time under practically identical conditions of lighting and air. This habit is the more interesting because of Monet's series of pictures, each series showing the same natural object in different settings of light and atmosphere — for example, his scores of 'Haystacks' or the many pictures of Rouen Cathedral. He was the first to use the unmixed tones in painting «vibrating light» and is particularly fond of blue and yellow as color themes. Maupassant said of him that he «discovered the art of painting.» His best canvases are 'The Mouth of the Seine,' 'Lavacourt,' 'Bordighera,' 'The Orchard,' and 'Snow of Port Villers.' More than a score of his paintings belong to Americans and were exhibited at the Lotus Club, in January 1899.

Moneta, in Greek mythology, a name applied to Juno, known as the goddess of coin or money.

Mon'etary Commission of the United States Congress, a commission appointed in August 1876, by the 44th Congress, to inquire into the causes and economic effects of the decline in silver, the best means for resuming specie payments and other national monetary questions. The commission consisted of three Senators, three Representatives, and three monetary experts. Meetings were held in Washington and New York, during a period of six months. The results of these conferences were published by the government in monographs issued by the Treasury Department. See MONEY.

Monetary Conventions, conferences between European nations, for the regulation of their coinage. Two of such conventions have been held, the «Latin Monetary Convention,» and the «Scandinavian Monetary Convention.» The former includes France, Belgium, Italy, and Switzerland, the agreement having been made in December 1865, in virtue of which the coinages of those countries are of the same weight and fineness. Greece subsequently joined the convention, and assimilated her drachma to the franc. Spain, Austria and Hungary, Finland, Rumania, Servia, Bulgaria, and Monaco have also coined large amounts of either or both gold and silver money, of weight, fineness, and value, exactly proportionate to, or identical with that of the countries included in the convention. Since 2 Aug. 1892, the gold standard has prevailed in Austria, and since 1 Oct. 1897, in Japan. The «Scandinavian Monetary Convention» dates from 1873, and includes Norway, Sweden, and Denmark. See MONEY.

Monetary Systems of the World. The precious metals having been used as money by weight, it naturally followed that monetary systems developed along the same lines; originally the names of coins and units were the same as those of weights. Surviving examples of this are found in the *peso* of Spanish-American countries, the *lira* of Italy, the *mark* of Germany, and the *pound* sterling of Great Britain. The British monetary system, indeed, continues to this day the duodecimal feature of the troy system of weights, the £ having in ancient days been a pound troy of silver, and the penny 1/240 thereof, or a penny-weight. Even in the fineness of the coins the rule continues to prevail there, after almost every other civilized nation has adopted the decimal system; the British fineness for gold is 22 carats, $\frac{22}{24}$ (or $\frac{11}{12}$), expressed also .916⅔; the standard for silver is the old sterling $\frac{222}{240}$, or .925. The relation between the value of metals was formerly fixed arbitrarily; the commercial value now regulates the ratio.

National traditions, inherited methods, commercial relations, and political considerations have all materially influenced the development of the systems. Thus in the United States, in the colonial period, the British system prevailed in theory; actually the *shilling* of the mother country had a different value, the Americans having followed in great measure the Spanish system of the «piece of eight,» subsequently called the *dollar* of eight *reals;* and the «York shilling» was thus 12½ cents, whereas the British shilling had nearly twice that value. When the colonies became independent their new system largely followed the Spanish. In more recent times we find Portugal adopting the British fineness for her coinage; and Russia, a short time ago, modified her system slightly, to bring it into relation with the French. Colonies usually follow the systems of the mother countries; but the influence of commercial relations with neighboring countries is strong; as is well known, the Dominion of Canada uses the dollar system in preference to the British, both being legally permitted.

Monetary systems and terms persist with peculiar tenacity; in the United States the «bit» or eighth of a dollar is still used colloquially in the West and South; in British Guiana the old Dutch measures of value are still in vogue, although Holland lost that piece of territory several generations ago; in the Orient the Spanish-Mexican dollar is preferred to all other coins by nearly 500,000,000 people; in Abyssinia and vicinity the Levantine dollar continues to be provided by Austria, just as in 1780, when Maria Theresa reigned, the coins being struck with the old date and portrait; in British India the ancient rupee can never be superseded.

The nations of the world are classifiable roughly into four groups, respecting the values of their units; the first using large units, such as the pound, equivalent to about $5; the second having approximately the dollar unit; the third having units about one half the dollar, caused by the fall in the price of silver to one half its former rating; fourth, those using a measure approximately equal to the *franc* or *mark* (20 to 25 cents).

A further, and more important, classification arises from the metal used as the basis or standard; we have thus a group using gold only for full legal tender money, silver being merely subsidiary; there is another group, also employing the gold standard, but having a substantial amount of silver coin possessing equal legal tender functions with the gold coins; then the countries which have adopted the gold standard, but actually use silver coins only; and lastly, those having the silver standard, where gold is not a tender. A fifth class might be added, temporarily at least, composed of countries with nominally one or the other of the standards, but actually using depreciated paper, having hence a fluctuating standard.

Where the unit in gold would make too small a piece for practical purposes, it is not actually coined, only multiples thereof being used; thus the dollar of the United States, the franc, etc. All countries use silver for divisional or subsidiary pieces, and for the smallest transactions coins of 75 per cent copper and 25 per cent nickel, but called nickel, and of 95 per cent copper and 5 per cent tin and zinc, constituting bronze, are supplied. These pieces are almost invariably worth less intrinsically than their nominal value, being purposely more or less debased to prevent exportation. Some nations lower the value of subsidiary silver pieces by reducing the weight, others by lowering the fineness. Since practically all nations provide for the exchange of the divisional for full tender pieces, the former are maintained at their nominal value. The quantities furnished are limited to the estimated local needs. The legal tender power of the subsidiary silver pieces is usually about $10, and of the nickel and bronze about 25 cents. In countries where exceeding thrift or great poverty prevail, the smallest divisional piece represents a very small fraction of the unit.

Formerly both gold and silver bullion could be taken to the mints and coined into pieces; but since the great fall in the commercial value of the white metal its coinage is limited.

The value of the money of the silver standard countries is, in international relations, therefore regulated by the market price of silver. The standard for silver coinage in the United States is at the rate of $1.29,29 per ounce fine; since the ounce is, however, worth less than 60 cents currently, the bullion value of the silver dollar is less than 50 cents; but having full legal tender power in the United States, it circulates at its full nominal value of 100 cents. The Mexican dollar, or peso, is rated in the United States at about 50 cents, for, although it contains more silver than that of the United States, it has no debt-paying power there. Not so with gold coins, which the world accepts at their intrinsic value, herein measured, for convenience, by the grain of gold. The value of a grain of pure gold at the United States coinage rate is a very small fraction in excess of 4.3 cents, since gold is coined at the rate of 23.22 grains to the dollar; all gold and silver coins are alloyed with copper; thus there is added to the gold 2.58 grains of copper giving a total weight of 25.8 grains, with a fineness of .900.

Practically all nations use, also, one or another form of paper representatives of money, issued under varying governmental supervision; these are classifiable as (*a*) notes issued directly by the governments, (*b*) certificates of deposit for coin, (*c*) notes issued by banks or bankers. While bank-checks constitute a very large part of the instruments of exchange, they are not properly to be included herein as money.

In the following presentation of the monetary systems, the values of the units are given in money of the United States, those of the silver pieces at the coinage rate for silver dollars, rather than in the temporary market value of silver bullion. The actual value of any silver piece may be found by using the day's quotation for the ounce of fine silver, in New York, in cents, and applying the coinage rate above given. Thus the Mexican peso is equivalent to $1.0159; if silver is quoted at 58 cents, the rule would be $1.29,29 : .58 :: 1.0159 : x$. It is to be borne in mind, however, that in all except the silver-standard countries the subsidiary silver coin is maintained at parity with the gold unit, irrespective of its bullion value.

United States: *dollar* ($) = 10 *dimes*, each of 10 *cents*, each of 10 *mills;* bimetallic system. Standard gold unit 23.22 grains coined at .900 fine, into double-eagles ($20), *eagles* ($10), half-eagles ($5), and quarter-eagles ($2.50). Standard silver unit, 371.25 grains pure metal, coined at .900 fine (*actual coinage suspended*); ratio = 371.25 : 23.22 : : 15.988 : 1, and commonly called 16 to 1. Subsidiary silver 50, 25, and 10 cents; contents, 347.22 grains to the dollar, coined at .900 fine, hence equivalent at the coinage rate to 93.5 cents. Minor coins, 5 cents, of nickel, 1 cent, of bronze. The mill has never been expressed in coinage, and practically never used in accounts, although up to 1857 there was a 5-mill or half-cent piece.

Paper money is issued in all three classes: government notes secured by gold reserve; government certificates of deposit (1) for gold coin and (2) for standard silver dollars; bank notes secured by deposits of bonds with the government. Denominations as low as $1 are in use, in lieu of coin, the habit having been formed during the period of, and after, the Civil War, when the standard was depreciated paper.

EUROPE.

Great Britain: *pound sterling* (£) = 20 *shillings*, each of 12 *pence*, each of 4 *farthings*. Standard, gold; unit, 113.001 grains, value $4.86⅔, coined at .916⅔ fine; in pounds (colloquially *sovereigns*) and half-pounds. Silver, subsidiary only; shilling contains 80.73 grains pure metal, equivalent to 21.7 cents, nominal value 24⅓ cents. Coined at .925 fine into *crowns* (5 shillings), half-crowns (2½ shillings), *florins* (2 shillings), shillings, *six-pences* (½ shilling), and three-pences (¼ shilling). Minor coins of bronze, 1 penny, ½ penny, and farthing.

Paper money is issued by banks only, a certain fixed portion secured by bonds, the remainder only on actual deposits of gold; so that current issues are practically gold certificates. By far the greater part of the issue is made by the Bank of England, and its smallest denomination is £5. Some local banks issue £1 notes in limited amounts. The British mint coins money for most of the colonies.

France: *franc* = 100 *centimes*. System bimetallic; gold unit 4.48 grains, value 19.3 cents; coined at .900 fine into 100, 20, and 10 francs. Standard silver unit 69.44 grains, equivalent to 18.7 cents; coined at .900 fine, into 5-franc pieces only, which are exactly equivalent to two half-dollars; actual coinage suspended; ratio 15½ to 1. Subsidiary silver pieces 64.43 grains to the franc, equivalent to 17.3 cents, coined at .835 fine into 2, 1, and ½ francs. Minor coins are 25 centimes of pure nickel, bronze, 10, 5, and 2 centimes; centime (nominally .193 of a cent) not coined for use.

Paper money is issued only by the Bank of France; the maximum limited, but secured solely by assets of the bank; no special reserve; the chief officers of bank are appointed by government.

The French system is in use by the four other countries first mentioned below, constituting, with it, the Latin Union; it is, furthermore, adopted in several other countries in Europe and adapted by many others elsewhere, being the system most prevalent in the world. The French mint coins money for other nations.

Italy: *lira* = 100 *centesimi.* Unit = 19.3 cents; system identical with French. Paper money issued by three banks, secured by their assets, but required to have a coin reserve; government also issues notes secured by a coin reserve.

Belgium: *franc* = 100 *centimes.* Unit = 19.3 cents; system identical with French; paper money issued by one bank, modeled after the Bank of France.

Switzerland: *franc* = 100 *centimes.* Unit 19.3 cents. System identical with French; 36 banks issue paper money secured by their assets, but a fixed 40 per cent reserve is required.

Greece: *drachma* = 100 *lepta.* Unit = 19.3 cents; system identical with French, but *depreciated paper* standard prevails with gold at about 130. The notes are issued by one bank, similar to that of France, and by the government.

Spain: *peseta* = 100 *centimos.* Unit 19.3 cents; system practically identical with the French, but *depreciated paper* standard prevails with gold at about 131. One bank issues the paper money, secured by its assets, and nominally required to maintain a 25 per cent coin reserve.

Monaco uses, besides the French pieces, a special coin of 100 francs, coined at the Paris mint.

Servia: *dinar* = 100 *paras.* Unit 19.3 cents. French system adopted. One bank issues paper money, secured by assets, with 33⅓ per cent reserve in coin. There is a slight discount against the notes.

Bulgaria: *lev* = 100 *stotinki.* Unit 19.3 cents. French system adopted. One bank issues notes.

Rumania: *lei* = 100 *bani.* Unit 19.3 cents. French system adopted, but gold coin alone is standard money; one bank issues paper secured by assets and a 40 per cent coin reserve.

Germany: *mark* = 100 *pfenninge.* Standard gold; unit 5.53 grains, value 23.8 cents; is coined at .900 fine into 20- and 10-mark pieces. Silver subsidiary only; mark contains 77.16 grains pure metal, equivalent to 20.8 cents; coined at .900 fine in 5, 2, 1, and ½ marks. Minor coins of nickel 10 and 5 pfenninge, and of bronze, 2 and 1 pfenninge. Paper money is issued in limited amount by the government upon an equal sum of coin in the "war chest," thus nominally gold certificates, but not actually redeemable. The bulk of the notes are issued by banks, chiefly the Imperial; maximum sum graduated so that any excess over thrice the coin reserve is taxed 5 per cent; the assets secure the notes.

Austria-Hungary: *krone* (crown) = 100 *heller*; standard, gold; unit of 4.7 grains, value 20.26 cents; coined at .900 fine into 20- and 10-kronen pieces. Subsidiary silver coin at 64.43 grains to the krone, equivalent to 17.3 cents, coined at .835 fine into 5- and 1-kronen pieces. Minor coins of nickel 20 and 10 heller, and of bronze 2 and 1 heller; the latter nominally one fifth of a cent. One bank issues paper money, secured by assets and a fixed coin reserve.

Austria still coins, for the Levantine trade, Maria Theresa silver *dollars*, .833⅓ fine, containing 372.7 grains pure metal, equivalent to $1.004; and gold *ducats* and quadruple ducats, the former containing 53.1 grains of pure metal, value $2,288, coined at .986 1/9 fine, the highest degree of fineness used in coinage.

Sweden: *krone* = 100 *öre;* standard, gold; unit contains 6.22 grains, value 26.8 cents; coined at .900 fine in 20-, 10-, and 5-kronor pieces. Subsidiary silver is coined at .800, .600, and .400 fine, hence the pieces vary in intrinsic value. The silver krone contains 92.59 grains pure metal, equivalent to 24.9 cents. Minor coins are of bronze, the 1-öre piece being nominally ¼ cent. Notes are issued by several banks, the chief one being the property of the government; the issues are secured by assets.

Norway: System identical with that of Sweden. Notes are issued by one bank controlled by the government, secured by assets, but with a 50 per cent coin reserve.

Denmark: System also identical with that of Sweden. One bank issues paper money secured by assets, and to an amount governed by the coin reserve.

Netherlands: *florin (gulden)* = 100 cents or *stivers.* System bimetallic. Gold unit is 9.33 grains, value 40.2 cents, and coined at .900 fine into 10-florin pieces. The silver unit is .945 fine, contains 145.83 grains pure metal, hence equivalent to 39.3 cents. There is a *rixdaler* (equals 2½ florins), a florin, and a half-florin. Subsidiary pieces are .640 fine and not proportional in weight. Minor coins of bronze 2½, 1, and ½ cents. Both the government and one bank issue notes, with ample reserve. *Ducats* and double ducats are coined for the Far Eastern trade. The value of the former is slightly less than that of the Austrian.

Russia: *ruble* = 100 *copecks.* Standard, gold. Unit contains 11.95 grains, value 51.46 cents; coined at .900 fine into 10- and 5-ruble pieces; 37½ rubles = 100 francs. Subsidiary silver is coined with the ruble, containing 277.72 grains pure metal, equivalent to 74.8 cents; actually, of course, only 51.46 cents. (Thus the silver ruble occupies an anomalous position, for, should the market value of silver rise sufficiently, the silver ruble would be worth more than that of gold.) The ruble and half-ruble are coined .900 fine, but smaller silver pieces, 20, 15, 10, and 5 copecks, are only .500 fine. Minor coins are 3-, 2-, 1-, ½-, and ¼-copeck pieces, of bronze. Paper money is issued by the Imperial Bank, owned by the government and a part of its finance department. A coin reserve is maintained.

Finland: *markka* of 100 *penni*, formerly; unit = 19.3 cents, being in accord with the French system, although the gold standard prevailed. Now superseded by the Russian system.

Turkey: *lira* or *pound* (£T) = 100 *piasters* of 40 *paras.* The unit, locally called the medjidie, contains 102.08 grains of gold, value $4.396, coined at .916⅔ fine into 5-, 2½-, 1-, ½-, and ¼-lira pieces. The piaster of silver contains 15.40 grains pure metal, equivalent to 4.2 cents; coined at .830 fine, the pieces being 5, 2, and 1 piasters; the para has a nominal value of .11 of a cent, and is also divided into 3 *aspes*, giving each of the latter a value of .036 of a cent. Paper money is issued by the Ottoman Bank, chartered in England, on actual gold on hand only.

Portugal: *milreis*=1,000 *reis*. Standard, gold, the unit containing 25.088 grains pure metal, value $1.08, coined at .916⅔ fine into *crowns* (10 milreis), 5, 2, and 1 milreis. Subsidiary silver, milreis, or 10 *testones*, of 353.66 grains pure metal, equivalent to 95.26 cents; coined at .916⅔ fine into 1, ½, ⅕, 1/10, and 1/20 milreis. Minor coins of nickel, 100 and 50 reis, of bronze 20, 10, and 5 reis. Depreciated paper money prevails, issued by one bank. Gold premium 8½ per cent.

ASIA AND OCEANIA.

China: *tael*=1,000 *cash*, nominally; standard is silver; there are 25 or more varieties of the tael, which is actually a weight; a small bar of silver duly stamped is the medium. The haikwan tael used for customs payments is generally the standard; the others vary 1¾ to 13¾ per cent in value measured thereby. The cash is a coin of base metal with a square hole in the middle, through which it is strung on cords; latterly 1,600 to 1,800 are reckoned to the tael. The theoretic division is 10 *hon*=1 *sen*, 10 sen =1 *hoo*, 10 hoo= 1 *cash*, 10 cash or *li*=1 *candareen*, of which 10=1 *mace*, of which 10=1 *tael*. The haikwan tael contains 590.35 grains pure silver, equivalent to $1.59 (actually less than 70 cents); thus the cash is nominally 1/10 of a cent. The Mexican *peso* is the best-known coin, accepted everywhere; the British *dollar* also circulates; and the mints established in 1890 have been coining a few dollars like the British, and divisional silver pieces of 50, 20, 10, and 5 cents, as well as copper 1-cent and smaller pieces, which are gradually finding their way into use. Hong Kong and local bank notes are used; the Chinese having first used paper money long before the Christian era. The cash is found mentioned in records as far back as they go, say 2354 B.C.

Korea: *liang*=100 *cash;* no definite standard; all sorts of coins circulate; the Japanese system is being introduced now, including banknotes, which never before existed. Local coins are of nickel and the brass cash.

Japan: *yen*=100 *sen*, each of 10 *rin;* standard is gold, the unit containing 11.57 grains of pure metal, value 49.8 cents; coined at .900 fine into 20-, 10-, and 5-yen pieces. Subsidiary silver coins are .800 fine, the 50-sen piece containing 166.40 grains pure metal, equivalent to 44.8 cents. Minor coins are 5 sen, of nickel, 1 sen and 5 rin, of bronze. Paper money is issued by the Bank of Japan, secured by assets, with a gold reserve.

Philippine Islands: *peso* of 100 *centavos* each; the government has just introduced the new gold standard system to supersede that of the Mexican peso. The gold peso contains one half the gold in the dollar of the United States, hence 11.61 grains pure; not coined, however; value 50 cents; silver currency is almost exclusively used; the silver peso contains 374.4 grains of pure metal, coined at .900 fine, hence not quite so good as the Mexican; and equivalent to $1.008, hence an anomalous piece; it has full legal tender power. Subsidiary silver pieces are exact subdivisions, 50, 20, and 10 centavos; nickel 5-centavo pieces and 1 and ½ centavos of bronze are provided; the last mentioned is nominally ¼ cent. Certificates of deposit for silver pesos in denominations of 2, 5, and 10 pesos are in use, issued by the government, and banks issue notes secured by coin in hand. To facilitate the introduction of the new system Mexican pesos and other coins are outlawed; a gold guarantee fund is established to maintain the arbitrary parity of 2 for 1.

Hong Kong: *dollar*=100 *cents;* standard is silver. This important, although small, colony of Great Britain uses the British *dollar* designed to supersede the Mexican peso; it contains 374.4 grains of pure silver, equivalent to $1.008, and with half-dollars, is coined at .900 fine, while 20-, 10-, and 5-cent pieces are only .800 fine. Minor coins are of bronze; cents, ½, ¼, and 1/10 cents are provided. Mexican pesos circulate as freely as these dollars. Paper money is issued by banks under British charters, based upon assets; the notes are used throughout the Orient.

Straits Settlements: Had the same system as Hong Kong, including the notes; but the government has decided to introduce the system in use in the Philippines.

French Indo-China (Tongking, Annam, and Cambodia): *piastre*=100 *cents;* standard is silver; unit contains 375 grains pure silver, hence better than the peso or the dollar; equivalent to $1.01, coined at .900 fine. Divisional pieces of ½, ⅓, and 1/10 piastres are coined, also minor coins of bronze of 1 and ½ cents, the latter known as *sapeque*. A bank under French charter issues notes secured by assets.

Siam: *tical*=4 *salungo*, each of 2 *fuang*, each equal to 800 *cowries* (shells). Standard is silver, the unit being a bent bar of 212 grains pure metal, equivalent to 60 cents. Minor coins of copper are taking the place of the cowries: *seek* (½ fuang)=2 *pai*, each of 2 *att*, each of 2 *solot*, the latter nominally ½ cent silver. Mexican pesos are largely used, rated at 1⅖ ticals. An attempt to fix a gold standard with the tical rated at 26 cents is under way. Several foreign banks, and also the government, issue paper money.

British India: *rupee*=16 *anna* of 4 *pice*, each of 3 *pie;* standard is now gold (£=15 rupees); the currency is, however, silver, the unit containing 165 grains of pure metal, equivalent to 32.44 cents, which is the arbitrary nominal value as well; maintained, as in the Philippines, by a gold reserve fund; coinage is .916⅔ fine; pieces of 1, ½, ¼, and ⅛ rupees are struck; and bronze pieces of ½, ¼, ⅛, and 1/12 anna, the smallest nominally equal to .0016 cent. Paper money is issued by the government, notes being fully covered by coin and government bonds.

Ceylon: Has substantially the same system, dividing the rupee into 100 cents.

Mauritius: Also has the rupee system, divided as in Ceylon.

Portuguese India: Uses a half-rupee, known as the *xerafin*, of 5 *tangas*, each of 60 reis.

Java: Sumatra: Celebes: Use the Netherlands' system of florins, and a bank chartered by the home government issues paper money secured by assets and 40 per cent coin reserve.

Borneo: Nominally uses a *dollar* of 100 *cents;* few coins except cents and half-cents of bronze are in use, except in Sarawak, where divisional silver pieces have been supplied.

Samoa: Uses British, German, and United States coins.

Australia: £=20 *shillings* of 12 *pence*, each of 4 *farthings;* the British system is used completely, paper money being issued by banks chartered in England, the notes fully covered by coin. Local mints coin gold; smaller coins are furnished from the British Mint.

Fiji and New Guinea: Are using chiefly British silver and bronze money, but in the German part of the latter the mark system prevails with a distinct coinage.

Hawaii: Has the system of the United States complete.

Persia: *toman*=10 *krans* of 20 *shahis* of 50 *dinars;* the kran is the actual standard unit, and is of 64 grains pure silver, equivalent to 17.2 cents. The toman is supposed to contain 39.583 grains of pure gold, hence worth $1.704. There are divisional and minor coins, the *abassi* of 4 *shahis*, each of 2 *puls;* the last mentioned is nominally .0042 cents. A bank issues notes on assets secured by 30 per cent reserve; gold is at a premium of 95 per cent.

Afghanistan and Baluchistan: Have no systems, but had used rupees almost exclusively until Russian influences introduced the ruble.

Turkestan and Bokhara: Have become Russianized.

Arabia: Has only nominally a system, the Maria Theresa dollar being divided into 80 *cabir*.

Siberia: Is, of course, entirely Russian.

Tibet: Retains the old Chinese system, though little money exists.

AFRICA.

Egypt: £E=100 *piastres* of 10 *ochr-el-guerche;* the standard is gold, the unit being the largest in the world, containing 114.778 grains of pure metal, coined at .875 fine, value $4.943; not much gold is actually used; silver is coined in 20-, 10-, 5-, 2-, and 1-piastre pieces, at .833⅓ fineness, making the piastre, containing 18 grains pure metal, equivalent to 4.9 cents. Minor coins are the 1 piastre and 5, 2, 1, ½, and ¼ ochr-el-guerche, the larger ones of nickel, the latter two of bronze. The smallest coin is equal to ⅛ of a cent. Paper money is issued by one bank, secured by coin and bonds.

Abyssinia: Still uses the old Austrian dollar of 1780 and rupees; but under Italian influence it and

Eritrea: Have come to use a new dollar, with halves, quarters, and tenths; the dollar known as *talari*, being equivalent to 5.2 francs or $1.0036. Standard is silver.

Zanzibar: Also uses the old coins, but in addition a *dollar* of its own, with 5- and 2½-dollar pieces in gold, 1, ½, and ¼ in silver; all are .900 fine. There is a copper piece, *pesa*, which is the chief circulating medium away from the cities on the coast.

Mozambique: Also uses the Austrian dollar and rupees, but Portugal is introducing a system adapted from its own. The *barinha*, equal to 26½ reis, is the chief piece.

German East Africa: Has a *rupee* divided into 100 *heller*, of silver, equivalent to .888 cents; also bronze minor coins.

Madagascar: Has now the French silver system practically complete.

Natal: Has the British system intact, with British chartered banks issuing notes fully covered by coin. The standard is, of course, gold.

Cape Colony: Likewise has the British system unmodified, which now reaches into the

Transvaal or British South Africa: But the former (Boer) system was also British.

Interior Africa: Has a fondness for copper pieces, and tons of these coins have been sent there; some silver also enters, rupees being largely used.

Kongo: Under Belgian influence, uses the Latin Union system, but only silver and bronze coins are furnished, the latter having a circular hole in the centre for stringing; 1-centime pieces are included in the supply.

Saint Helena: Has British money.

Sierra Leone, Lagos, Gambia, and the Gold Coast use British money also, but, because of the adjoining French colony of

Senegal: The French coins are equally received; the same is true of

Liberia: Which has nominally the dollar of the United States as the standard.

These countries use little gold, more silver and large amounts of copper coins.

Morocco: Nominally has the *rial* of 10 *okia*, or ounces, of 4 *blankeels*, of 6 *floos* each. The rial is sometimes called the piastre and is equal to about 5 francs; in fact, French money circulates owing to the proximity of France's colony of

Algeria, which has the Latin Union system in full, with a large bank of issue modeled upon the lines of the Bank of France. This franc system is gradually extending into

Tunis, which formerly had a modified Turkish system of a *piastre* divided into 16 *karobs*, the unit equal to about 11⅔ cents, and of silver. Under the French régime the piastre is made equal to ⅗ of a franc.

Tripoli: Has not yet fully succumbed to modern systems, still retaining nominally a modified Turkish one of the silver *mahbub* of 20 piastres.

Malta: Has now the British system.

Cyprus: Where the British system was introduced, has gone back to the piastre of Turkey, with a value of 1⅓ pence to the unit.

AMERICA.

Canada: *dollar*=100 *cents*. £=$4.86⅔. The standard is gold, but there is no gold coinage, the needed coins coming from the United States or Great Britain under the theoretically dual system. Actually the dollar system has become almost universal. Subsidiary silver pieces of 50, 25, 10, and 5 cents are provided, at .925 fineness; they contain 331.75 grains of pure silver to the dollar, hence equivalent to 89.2 cents. A 1-cent bronze piece is the sole minor coin. Paper money is issued by the government, secured by gold and bonds, but much more generally by banks, secured by assets and a redemption fund.

Newfoundland: Always erratic, has also a *dollar* of 100 *cents*, but its unit is 23.54 grains of pure gold, value $1.014, coined at .916⅔ fine, into a $2 piece only. The standard is gold; subsidiary coins of 50, 25, 10, and 5 cents; the minor coin is a bronze cent.

The British West Indies: Have the British system, modified, however, by that of the United States, with subsidiary coins of the shilling divisions, including a 4-penny silver piece. A British chartered bank furnishes notes fully covered by coin. This category includes the

Bahamas, Bermuda, British Honduras, British Guiana, Jamaica, and the lesser islands belonging to the British, namely, Barbados, Trinidad, Saint Kitt's, Antigua, Dominica, Grenada, Saint Lucia, Saint Vincent, Tobago, and Turk's Island.

Martinique and Guadeloupe: Have the French system; so also have, nominally,

Saint Pierre and Miquelon, near Newfoundland, and French Guiana.

Saint Thomas and Santa Cruz: Use Danish money, as do also

Greenland and Iceland, what little is needed there.

Dutch Guiana and Curaçao use the Netherlands system.

Porto Rico has the United States system in full.

Cuba: Has not yet eliminated the old Spanish-Mexican composite system, but has substantially adopted that of the United States. The old system included the ancient doubloon of gold, of 365.46 grains pure, value $15.74, coined at .875; the peso of 8 reals for silver, and the peseta system of Spain. There was also an Isabella doubloon of $5.01⅓. Minor coins of bronze are 10, 5, 2, and 1 centimos, the largest nominally 1.9 cents.

San Domingo: Has also adopted the dollar system of the United States. It still uses the division into centavos.

Haiti: However, retains the French, only slightly modified in that the unit, *gourde*, exactly 5 francs, is divided into 100 *cents*. United States gold is also legal tender; but depreciated paper money is the standard, gold being at 118 to 150 premium.

Mexico: *peso* = 100 *centavos;* new standard is gold, currency is silver. The standard theoretic unit is 11.57 grains of pure gold, value 49.9 cents; the silver peso is 377.18 grains pure silver, coined at .9027 fineness, the ancient Spanish standard, equivalent to $1.016. Subsidiary pieces are exact subdivisions, and are coined in 50, 25, 10, and 5 centavos. There is also a bronze centavo piece. Numerous banks issue notes fully secured by coin. The importance in the commercial world of the peso, which began its career over four centuries ago, is now disappearing; the records show that 3,500,000,000 of these pieces have been coined at the Mexican mints, most of them having been exported. The history of this coin is unique.

Nicaragua: *peso* = 100 *centimos;* the standard is silver, the unit containing 347.23 grains of pure silver, equivalent to 93.5 cents, hence substantially modeled upon the French system, the peso being exactly equal to the 5-franc piece. Pesos, ½, and ¼ pesos are coined at .900 fineness, but the 10- and 5-centimos pieces at .835. The minor coin, 1 centimo, is of nickel. The government and banks issue paper money which is depreciated; and gold coins also circulate, those officially coined being the *onza* or *doubloon*, of 365.46 grains pure gold, value $15.74, which, with the ½ onza, is coined at .875 fine, the old Spanish standard. There are also 20-, 10-, 5-, and 2-peso gold pieces at .900 fine, pure contents 22.40 grains to the peso, value 96.5 cents.

Honduras and Salvador: Have the same system.

Guatemala: Same system in theory, but depreciated paper is the standard, and for divisional pieces the *real* (one eighth of the old Spanish dollar) and fractions thereof, coined in nickel, are in use.

Costa Rica: *colon* = 100 *centimos.* Standard, gold; unit 10.806 grains pure, value 46.5 cents; coined at .900 fine into 20-, 10-, 5-, and 2-colon pieces. Subsidiary silver, 50, 25, 10, and 5 centimos are coined at .750 fine, and there is a nickel centimo piece.

Panama: *balboa* = 2 *pesos* of 100 *centavos.* Standard is gold, the unit being the exact counterpart of the dollar of the United States; the peso is of 347.22 grains pure silver, equivalent to 93.5 cents, hence upon the French model. Coinage is at .900 fine, and there are subsidiary pieces exact subdivisions of the peso. Of course the actual value of the peso is 50 cents, although it contains twice as much silver as the half-dollar of the United States.

United States of Colombia: *peso* = 10 *decimos* of 100 *centavos* each. Standard is depreciated paper. Gold standard adopted with the dollar system; peso of 23.22 grains pure gold, value $1, eventually to be coined at .900 fine into 10-peso pieces; silver coins are based upon the French system, the peso of 347.22 grains pure, equivalent to 93.5 cents; fineness .900; 2-, 1-, and ½-decimo pieces .835 fine, the largest containing 64.43 grains pure silver, equivalent to 17.3 cents. Gold has been quoted as high as 25,000 per cent premium, but is now rapidly nearing parity.

Venezuela: Has the French system modified: the peso or *venezolano* of 5 *bolivars* of 20 *centavos* each; the peso in gold, 96.5 cents; in silver, 93.5 cents; thus the bolivar is the same as the franc. Standard nominally bimetallic. Subsidiary coins are identical with Colombia's.

Ecuador: Gold standard adopted but silver currency still prevails; the same peso or unit in silver as the preceding, equivalent to 93.5 cents; called the *sucre* of 5 *pesetas*, each of 2 *reals*, each of 10 *centavos.* Divisional coins are .900 fine, making the peseta equivalent to 18.7 cents. Standard, actually depreciated paper. There is a gold coin of 10 sucres, containing 113.001 grains pure metal, hence equivalent to the pound, $4.86⅔, but it is coined at .900 fine. Banks issue the paper money, which is at 50 per cent discount as to gold.

Bolivia: The same Frenchified peso, equivalent to 93.5 cents; silver standard; unit called the *boliviano* of 100 *centavos;* divisional pieces are of the same fineness as the unit, .900.

Peru: Has the same system, the peso called the *sol*, of 10 *dineros*, each of 10 *centavos;* equivalent to 93.5 cents. All coins are .900 fine. No paper money permitted. A gold coin called the *libra* (pound) *peruana*, containing 113.001 grains pure metal, value $4.86⅔, is coined at .916⅔ fine; also a half-pound.

Argentina: *Peso* = 100 *centavos;* nominally bimetallic, actually on depreciated paper basis. Unit in gold the same as the 5-franc piece, value 96.5 cents, in silver 93.5 cents. Gold coins are the *argentine*, equal to 25 francs, and half argentine; all coins are .900 fine, hence the silver coin like the 1-franc piece is equivalent to 18.7

cents. Nickel 20, 10, and 5 centavos, bronze 2 and 1 centavos. The government issues paper money; the discount is 56 per cent.

Chile: *Peso* = 100 *centavos;* gold standard, radically changing the ancient value of the unit which has 8.475 grains pure gold, value 36.5 cents; the gold coins are .916⅔ fine and are the *condor* (20 pesos), *doubloon* (10 pesos), and *escudo* (5 pesos). Silver is subsidiary, all at .835 (French) fineness; the peso of 257.72 grains pure metal is equivalent to 69.4 cents, an anomalous coin; divisional pieces are 20, 10, and 5 centavos. Minor coins of nickel are 2, 1, and ½ centavos. Depreciated paper continues the actual standard.

Uruguay: *peso* = 100 *centesimos;* has the gold standard. The peso has 24 grains of pure gold, value $1.034, coined at .917 fine; subsidiary silver is identical with that of Argentina, the French system, but with .900 fineness for all. Minor coins are of nickel. Paper money is issued by banks.

Paraguay: *Peso* of 8 *reals,* the old Spanish system; modified also by divisions of the peso into 100 centavos. Depreciated paper issued by the government is the standard. No gold or silver coins of its own; nickel pieces of 20, 10, and 5 centavos and foreign coins of larger value, constitute the circulation beside the paper, which latter is rated at 11½ cents gold to the peso.

Brazil: *Milreis* = 1,000 *reis;* gold standard system modified from Portuguese; unit, about ½ that of the latter country, contains 12.69 grains pure gold, value 54.6 cents; 20, 10, and 5 milreis pieces are coined, nominally at British fineness, actually at .917. Subsidiary silver 2, 1, and ½ milreis, the milreis having 180.43 grains pure silver, equivalent to 48.6 cents, also .917 fine. Minor coins 1-5, 1-10, and 1-20 milreis of nickel; 40, 20, and 10 reis copper, the latter nominally .0054 cents, so that the theoretic reis is .00054 cent. Depreciated paper issued by the government forms the monetary basis, gradually moving up to par; gold premium about 80.

MAURICE L. MUHLEMAN,
Late Deputy Assistant United States Treasurer.

Monetite, a native acid phosphate of calcium, $CaHPO_4$, occurring massive and in small, triclinic crystals, in the islands of Moneta and Mona, in the West Indies. The mineral is found in limestone, beneath a deposit of guano. (Also spelled "monitite.")

Money, Walter, English author: b. Donnington, Berkshire, 21 Aug. 1836. He received his education in a private school and early began to study on historical and archæological subjects, and for a number of years was the local secretary of the Berkshire Society of Antiquarians, London, and of the British Archæological Association. From 1889-97 he was a member of the Berkshire County Council. Among his publications are: 'The History of Hungerford'; 'The History of Speen — the Roman Spinæ'; 'Church Goods in Berkshire'; 'The Two Battles of Newbury, 1643-4'; 'The Story of the Siege of Donnington Castle'; 'The Siege of Basing'; 'A Royal Purveyance in the Elizabethan Age'; 'A Popular History of Newbury and the Neighborhood' (1905).

Money, the term used to designate the medium of exchange, the standard or measure of value; in ordinary use, however, it is applied only to coin and paper currency.

Barter.— The primary trading of mankind was simply the exchange of one object for another, termed *barter.* In the course of the development of the race, the increasing interchange of commodities between individuals and tribes made it evident at a very remote period that even the crude form of commerce then existing would be greatly facilitated by the use of some one commodity as a general medium. The difficulties encountered in the process of mere bartering, even in the age when man's wants as well as his products were few, can be appreciated only if we can imagine conditions under which, for example, a producer of wheat desiring shoes, was compelled to find a shoemaker who at the same time needed wheat and would part with the shoes in exchange therefor. If the latter's need for food-stuff were fully supplied, he would not care to exchange the leather and labor represented by the shoes for grain; but he might be in need of a hammer and nails and the owner of the wheat would be compelled to find a blacksmith desiring wheat, from whom to obtain that which would procure him the shoes. It is quite conceivable that the purchase of a pair of shoes then cost more time and trouble than their manufacture; but when the farmer could exchange his wheat for something which the shoemaker in turn could use to procure a hammer and nails or almost anything else he needed, the trade was easily consummated. Again, if the question arose, How many nails will equal the cost of a pair of shoes? the answer might be difficult; whereas when a definite quantity of nails is to be had for a certain quantity of money which in turn is the cost of the shoes, the measuring is speedily accomplished. What may be termed the *lesser trade* (retail) of the world consists of an almost unlimited number of such transactions which are now so readily adjusted by means of money, that its importance as a medium is rarely thought of. Yet there is probably no device that mankind has made use of which has served more effectively to promote civilization.

Early History.— A multitude of articles and substances have been utilized for the purpose of money, the selections depending in each case upon the attending circumstances: in the nomadic state skins of animals, in the agricultural the animals themselves (domesticated); proximity to the seashore furnished the opportunity to use shells, usually those of a superior quality; staple products of the soil, such as grain, beans, tobacco, etc., proved acceptable at times; later almost all of the metals known to the ancients came into use, practically in the order of their value to-day, the less valuable first. Indeed the evolution was steadily toward the commodity which would serve the purpose best, each of the others being rejected in turn as experience disclosed its defects. This progressive improvement took place in each community as its civilization advanced; hence some were ahead of others and profited thereby. The use of articles generally condemned as unfit still continues among peoples only partially civilized; thus lead is still used in Burma, cowrie shells to this day form a part of the money supply of Siam and countries round about, and beads are current money in many parts of Africa and Oceanica. We find that in communities well advanced in civilization the paucity of precious metals and other circumstances compelled the use of other articles; thus in the successive frontier settlements in the United States skins of beaver and other fur-bearing animals were generally given monetary functions; and it will be recalled that the early colonists employed the wampum (shells) of the Indians in the North and tobacco in the South. It was requisite that the object selected to serve as money possess value, immediate or potential, for ordinary uses, for purposes of ornamentation or for the gratification of other desires; since no one would, generally speaking, part with his property or his labor for something having no value direct or indirect, objects lacking this quality could not for any extended period prove acceptable.

Gold and Silver.— The selection of the precious metals (gold and silver) which in the course of the evolution became so general, was preceded by their use for ornamentation which made them almost universally desirable, giving them a special value. This value has been substantially increased by their use in the arts; but their use as money unquestionably has added much more; for it must not be lost sight of that gold and silver are commodities the value of which is subject to the same law of demand and supply which controls that of other commodities; the monetary use of the metals now constitutes the chief demand. The ultimate selection of these metals for the principal monetary purposes was due entirely to their special adaptability, hence to the operation of natural law. In addition to their being desirable, they possess the following qualities now demonstrated to be requisite to a just and equitable medium of exchange, and without most of which no substance could serve as an honest measure of value: relative *scarcity* compared with iron, lead, copper, etc., to which are due their greater value and the relatively greater stability of their value; *portability,* containing as they do large values in small bulk; *durability,* since they are not subject to corrosion or other ordinary decay, hence practically indestructible; *homogeneity* or uniformity, since unlike other commodities the quality of these metals (when duly separated) is practically identical no matter where they are found; *divisibility,* rendering them capable of being divided into small parts and again united without appreciable loss. Manifestly a commodity frequently varying in value (wheat for example) would not serve as a just measure any more than would a yard stick that grew shorter or longer; a destructible commodity might cause the seller to be deprived of a part or the whole of the value which he expected to possess when he parted with his goods; bulkiness and indivisibility would seriously hamper exchanges; furthermore if too plentifully and easily produced the metals would be worth less and be subject to too much fluctuation.

Early Coinage.— The historical evidences of the early uses of gold and silver are not such that a fixed date can be referred to; it is, however, certain that silver was in general use before gold, and that both were employed as early as 1800 B.C., which indicates that the intelligence of certain nations, born of their experience, had caused them to seek for something possessing some or all of the attributes above named for several centuries anterior to that date. During all of this period and certainly until 900 B.C. the metals passed by weight, in bars and ingots or in crude form (dust, etc.); the shekel, the talent, the as, of the ancients were weights just as the tael of China is to-day; and the names of certain coins are, or were, names of weights, viz.: drachma, mark, pound, livre, lire, peso, peseta. The use of the metals as money by weight for the greater portion of the trading at that time proved a cumbersome process, involving as it did continuous reference to scales; and doubtless the defects in the means of weighing and of determining the purity of the metals, brought about over-reaching and innumerable disputes. It was therefore a most important advance when by the introduction of the device of coining both the weight and the purity of the metals were certified by a more or less authoritative stamp. History accords the credit of this improvement to the early Greeks, and fixes the date at about 900 B.C. As in the course of time other nations adopted the same method, and the authority to coin money was by common consent given to the rulers, the people regarded themselves protected against fraudulent impositions of base metals and false weights, and exchanged their products freely for this convenient form of money. It must be continuously borne in mind that the great mass of people, even in the present enlightened age, know comparatively little of the character and functions of money; and in the early ages they necessarily depended in a much greater degree upon certain marks to identify the coins, after learning by experience that certain pieces would, and others would not, procure for them what they required; and since the chief end in view was the facilitation of the exchanges in every way possible, the enormous advantage of a system of coined money becomes apparent. Moreover coin served more effectively for the measuring of values; definiteness, precision and prompt action became possible; while in the periods when other articles were used and in a less degree only when the metals were employed by weight, these elements were lacking, and measuring values was continuously attended by obstacles. The general adoption of silver, and later gold as well, for money coinage did not prevent the extensive use of copper and other metals for the same purpose; but important as the functions of these base-metal coins were for long periods, they need only be discussed as «token money» to which they were ultimately reduced by all nations.

False Money.— The coining power has universally been recognized as a prerogative of the government, no matter what the form of the latter; unscrupulous monarchs took advantage of the ignorance of the people to debase the «coins of the realm,» causing them to be made of less metal than the stamp indicated; this method of defrauding the people was also imitated by shrewd individuals who reduced the value of the pieces by «sweating» (removing part of the coin by chemical or artificial means), and by clipping off a portion; beside these practices the natural abrasion (from wear and tear in use), when coins were circulated for too long periods, also served at various times to render the money of some countries the means of cheating the ignorant and unwary. These base coins were usually detected only when they reached the few intelligent persons, who refused to receive them at their stamped valuation; but even thereafter the pieces circulated quite freely because of the imperative need of the people for some form of counters with which to make their daily exchanges. When the cheating became unbearable, the people rebelled and corrective measures were adopted or a new ruler was substituted. In many instances the ruler's fraud was followed by an edict that the base coins must be received by the people at the valuation expressed thereon, which edicts were practically the first "legal tender laws," of which more hereafter. Honest errors of judgment also caused similar results; thus in 1792 our mint law fixed the ratio of silver to gold at 15 to 1, when the actual ratio was seriously fluctuating; the disturbance caused continued until the change in 1834 when the ratio of 16 to 1, also erroneous but in a less degree, was adopted. These attempts to arbitrarily interfere with the operation of the natural laws of money and exchanges served only temporarily, since the prices of commodities soon adjusted themselves to the new standards thus created. In other words, an article selling usually at a shilling would, when the shilling was reduced to one half its former weight in silver, cost two shillings; the shilling in effect became only a half shilling. As the trade between nations developed this also served to correct many of these evils; for obviously the force of the legal tender laws did not extend beyond the borders of one country; and not only was the mercantile class sufficiently intelligent to detect base or reduced coins, but those in the international trade refused to recognize the stamp as conclusive evidence of the value of the coins, accepting them only by weight and fineness (purity of the metal); indeed international transactions in the metals are to this day effected by weight and not by tale or number of pieces. Hence, it may be observed here, bullion (uncoined metal) is generally preferred to coin for international settlements. The point to be specially noted, is, that the natural economic laws prevailed in the long run, despite royal edicts and laws of parliaments, which endeavored to establish fictitious values and unjust money and measures. During one of the periods when England was suffering from the wretched state of its coins (about 1559), a study of the conditions led to the discovery of what is known as Gresham's law, that good money will be displaced by bad in a community where the bad money may be used to discharge obligations. Manifestly if one species of coins contained greater value than another, both having equal debt-paying power, the inferior would be parted with first and put into circulation. In obligations payable outside the country the superior pieces would be employed, thus leading to their exportation. For example, the grain of gold has a value, practically fixed, throughout the civilized world; a coin which the law decrees shall contain 100 grains, may circulate at home even when reduced to 99; the full weight piece alone will bring full value abroad.

Credit.— The use of the precious metals and especially after the introduction of coinage, developed further functions of money, namely, its service as a *store of values* and as a *standard for deferred payments;* every individual having a surplus of products beyond his needs was able, by exchanging it for coin, to lay away the latter for future needs, conscious of the fact that such action in no wise depreciated his wealth; and moreover he could dispose of his commodities for a promise to pay such coin in the future knowing that ultimately the value would come to him if his debtor met his obligations. The latter form of transactions was possible only after a community had reached a stage of civilization when *credit* became a factor; when men trusted each other to a measurable degree; when leases, promissory notes, and other forms of contracts came into vogue. The great importance of the requisite of *stability* of the medium of exchange can be better appreciated when considered in connection with these two functions; a form of money which might in several months, or a year, lose a substantial part of its value would defraud him who was to receive it or who held it for future use; conversely if the money appreciated the debtor would be mulcted by being compelled to give greater value than he actually contracted to give. These principles were not learned at once even by the most intelligent; it was necessary that mankind pass through many periods of oppression and distress before they became patent; the people were ultimately brought to demanding not only that their rulers act honestly respecting money, but that tampering with it by individuals be punished most severely; even our own first mint act (of 1792) provided the punishment of death for debasing the coinage on the part of mint officers.

Ratio.— When the two precious metals came into joint use, the fact that gold was, owing to its greater scarcety, superior qualities, and beauty, esteemed more highly than silver, made it necessary to recognize it as of greater value in money form; this value relation is known as the *ratio.* For many centuries silver and gold were thus used jointly by the civilized world, both having full debt-paying power when coined; more silver being universally required to constitute a given coin value than if the coin was of gold; and although the process was slow, the value of silver gradually fell, a larger supply relative to the demand (and compared with gold) having been made available by the products of the mines. Thus, the ratio which at the beginning of the Christian era was about 9 to 1, had fallen by 1500, to 11 to 1; in 1600 about 12 to 1 is recorded; in 1700 it was 15 to 1; in 1800 15.4 to 1; in 1870 15.6 to 1; moreover the fluctuations in the intervals had been very considerable; and since the world's intelligence was continually seeking for greater stability, a definite movement for the demonetization of the white metal began soon after the last mentioned year. This involved not only the sale of old silver coins but diminished the demand for silver for new coinages, and necessarily accelerated the fall in its market value; with the result that the ratio at the beginning of the 20th century, when practically all civilized nations had adopted the single gold standard, stood at 32 to 1. But it was only as full-debt-paying money that silver was demonetized; in fact, more silver is in actual monetary use than ever before, but in a subordinate capacity, as subsidiary coin, for the smaller payments of retail trade and for fractional sums.

Subsidiary and Token Money.— Subsidiary coin is designed for domestic use only, each nation having its own. By making the pieces of less relative value than the chief coins, they were rarely exported; whereas formerly the people were deprived of their "small change" whenever an extraordinary demand for silver arose. Thus in the United States in 1845–52, there was such a dearth of fractional pieces that the people were compelled to use tickets, stamps, etc., until by the law of 1853 the coinage of pieces of less weight was ordered. (Two half-dollars weigh about 7 per cent less than the silver dollar.) Subsidiary coin has only a limited legal tender power; indeed it may be said that it is a higher species of token money, by which is meant a form possessing little or no value, and used merely in the capacity of counters, but indispensable for the smallest transactions. The ordinary token money is to-day made of nickel and of bronze (a composition of copper, tin and zinc).

Quantity of Money.— The quantity of money available is an important factor in the maintenance of stability of values; a surplus causes a rise, and a dearth brings about a fall, of prices. The interest or discount rate is the index of the supply, and is regarded as the price of money. But the quantity which any given community requires can not be determined with anything like definiteness. If natural laws alone operated, the movement in prices would in large measure correct a temporary local dearth; for prices ordinarily indicate the measure of the demand for money, and it will like other commodities flow to the locality where it commands the best return. A general dearth, however, brings about distress, paralyzing exchanges and checking enterprises; a general plethora has the contrary effect, and unless corrected causes overspeculation and its attendant evils. Statistics of the world's metallic money supply are not available for the earlier periods; but existing estimates of the European stock give for about the beginning of the Christian era $1,800,000,000; for 500 A.D. less than $500,000,000; for 800 A.D. less than $200,000,000. To this enormous decrease is attributed the backward trend of civilization during the Dark Ages, a tendency not counteracted until after the discovery of America (1492) and its vast stores of silver and gold; by 1600 the stock available is estimated at $650,000,000; by 1700 it had reached $1,500,000,000; early in the 19th century the $2,000,000,000 was reached; and at the opening of the present century the stock of gold and silver in the world was approximately $8,500,000,000. Of the annual product of gold, now about $300,000,000, about 70 per cent is added to the money supply.

Credit Money.— Notwithstanding the portability of the precious metals it was in time found practicable to save the trouble, risk and cost of transfers of coin and bullion, by the introduction of paper representatives of the metals. The earliest form of these now so generally acceptable devices was merely a receipt given by the gold- and silver-smiths and others who made the handling of the metals a special business. Obviously this was possible in any important degree only after *credit* had become a factor in trading. Indeed, the earliest instance in the history of the Western World of the use of a substitute for coin was the practice of merchants, begun in Italy some six centuries ago, of depositing their specie with one of their number, each receiving a credit upon his books and making payments by transferring such credits to others; a crude form of banking said to have arisen because of the great diversity and variation in value of the coins issued by the numerous small principalities then existing. (It is a well established historical fact that in China the use of these and much more advanced forms of paper money were in use some centuries earlier). The paper receipts and book credits were in time followed by orders to pay the specie deposited, which were acceptable wherever the parties to the transaction were known; the use of such orders became quite general among merchants, and as credit became more general they were also employed in international transactions; in the last mentioned use they were called bills of exchange.

Bank-checks and Bank-notes.— Another form of transfer of credit is the bank-check, which is an order upon the bank where money has been previously deposited or a credit established otherwise, to pay money in discharge of a purchase or obligation. These several devices save not only the transfer of the coined money, but practically increase the amount available; fully 97 per cent of the enormous volume of the international commerce, and 92 per cent of the equally large domestic trade transactions in the United States, are adjusted by means of bills of exchange, drafts and checks, thus avoiding the necessity of sending coin to and fro, and enabling its utilization for other purposes. The process of banking has added further to this economization of coin; for the bank-checks, while not circulating extensively, nevertheless very frequently pass from hand to hand and only a small portion of the great mass is ever presented to be paid in money, the rest being deposited to establish fresh credits in the banks; and the banker is enabled to use a substantial part of the cash held by him to give further credits. The institution (about 50 years ago) of clearing-houses, where the banks exchange these deposited checks daily, further reduced the amount of money actually handled. While these instruments are not ordinarily termed money, it will be observed that, since they perform a most important part of the service of a medium of exchange, the designation of *credit money,* applied to them in the recent past, is entirely appropriate. A form of paper which is more generally regarded as actual money, known as the *bank-note,* was an evolution from the preceding forms. It is merely the promise of the bank, authenticated by its officers, to pay a fixed sum of money on demand, and in its earliest form represented coin actually held in bank to redeem it. The Bank of Sweden is credited with having first (1658) issued this form of paper money. Originally written, the notes were ultimately in printed form, for round sums and small denominations. The great convenience of bank-notes for general use by the more intelligent in the community, soon made it evident that only few out of a given number were presented within a given time; the banker thus found it practicable, when his credit was well established, to issue more notes than the sum of coin in bank available for their redemption; and further experience demonstrated the practicability of issuing two, three, and even four for one, under ordinary conditions; while it is not actually fixed what proportion of coin should be held in reserve, this depending not a little upon local customs, the margin may be stated at from 25 to 40 per cent. Here we have manifestly another means of increasing the potentiality of coined money to a community. As the mass of the people gradually learned that bank-notes were a safe and useful medium, the number of banks increased and provided notes for the several communities.— The conclusion that bank currency is a most valuable adjunct to coined money, rests upon solid premises; the supply of the precious metals alone could not have served the civilized world adequately in the development of trade and industries, which history records as the work of mankind in the last three centuries; even to-day the enormous supply is insufficient to meet the demand. Upon the other hand, the history of such currency, particularly in the United States, demonstrates that without the most carefully devised safeguards, it may, and usually will, become a curse to the people. Having in mind the indispensable requisites of a medium of exchange as hereinbefore set forth, it is obvious that bank-notes possess such requisites only when their credit is fully assured; in short, when the coined money can be secured if and when demanded. If this credit is lost, depreciation follows; the depreciated paper brings about results similar to those caused by debased coin, and is worse since, having not even a fraction of intrinsic value, it causes, when entirely discredited, complete loss to the holder; at best it has only a fluctuating value in exchange, and hence can easily be used as an instrument to defraud. In like manner, also, as in the case of debased coin, it drives out the better money. The community must therefore protect itself by law against such evils. Excessive issues of bank-notes, by inordinately expanding the amount of the available medium, are also followed by a measure of discredit, and frequently cause all the evils of depreciated paper. It is hence a requisite of a properly adjusted bank currency that the volume shall be regulated by general provisions of law, so that, while supplying the natural need arising from the inadequacy of the metallic medium, it shall not be inflated beyond such needs and thus cause a disturbance in prices, speculation, and an expulsion of part of the coined money. We have in our own history an example of how an ill-regulated currency operates. The people of the United States during a greater part of the period from 1790 to 1865, with some notable local exceptions, had imposed upon them a bank currency which literally defrauded them continuously, because of the absence of those safeguards which the laws should have provided. The paper circulation included notes of mythical banks, notes of banks which never pretended to have coin in reserve, notes of defaulted banks, and of such as had deliberately repudiated their issues; excessive issues were common occurrences; counterfeits abounded, and at times even the pretense of a bank was absent, individuals printing notes for circulation. This mass of paper was not money; the pieces merely served the purpose of counters, so long as the people, in the absence of anything else, were compelled to use them. When the nationalizing influence of the Civil War period prevailed, the people turned from the farcical bank-note system to one which provided for notes secured by bonds, which are absolutely safe but not bank-notes; for the so-called national bank-notes are based upon the credit of the national government.

Government Notes.— This brings us to the consideration of the last of the forms of paper money, the ***government note***, which is a promise to pay coin on demand. Except when in the form of certificates for coin actually held, these notes are dependent upon the revenues and the credit of the government. So far the world's experience with this class of paper money has been invariably disastrous. The beginning of the issues has always been due to extraordinary needs of the government, as in case of war, when the duty of raising revenue by taxation or straightforward borrowing was evaded; and since the exigencies were usually severe, the promises to pay coin were usually broken. Not only did the ensuing discredit cause depreciation, but by the increase of the volume, which always followed, the fall in values was accelerated. Thus, in our colonial period, notes issued by colonial authorities depreciated so that at one time £1,100 of paper was required to obtain £100 coin; in the Revolutionary period continental currency fell to a point where the rate was 1,000 to 1; and during the Civil War our "greenbacks" at one time were worth less than 40 per cent of the face. These notes all served as a medium, but a fluctuating, hence dishonest, one, by means of which the shrewd few were enabled to accumulate inordinate wealth at the expense of the mass of the people. It is patent that individuals hesitated to accept such a medium, non-convertible into coin; and hence legal tender laws were enacted to compel the acceptance. Such notes are generally known as "fiat money," the dictum of law alone giving them currency. Tested by the requisites for an honest medium of exchange, measure of values and standard for deferred payments, government notes, even the best that the ingenuity of man has been able to devise, fail to respond to the requirements. They usually depreciate, and since restoration to equality with specie is expensive, it is generally delayed, rendering the medium unstable for extended periods; equally expensive is the maintenance of a coin reserve, not dependent upon any natural sources of replenishment as in the case of a bank's reserve; the volume of notes, instead of being responsive to the needs of trade, is dependent upon legislative (frequently partisan political) exigencies; such a system must be reinforced by legal tender laws which interfere with the freedom of trade, compelling the acceptance of something which would often preferably be refused. It is not inconceivable that a government note system might be evolved which would fully serve the purposes in view; but it is certain that thus far the bank-note system, adequately safeguarded, affords the only form of paper money that fully answers the requirements. While the best examples of such a system which have stood the test of generations, are not identical in form, the general principles upon which such a system should be based are recognized in each. These principles may be generally stated as follows: (*a*) paper money should be used merely as an auxiliary to coin, to save the cost of using coin and to supply deficiency in the stock of coin; (*b*) its volume should be severely limited so as never to be in excess of the bank's ability to supply coin on demand; (*c*) the volume should within those limits contract and expand with the demands of trade; thus the requisites of security, prompt redemption and flexibility of volume are assured. (Our notes based upon bonds possess only the first requisite.) Inasmuch as the demands of trade constitute the reason for the use of paper money, trade considerations only should govern the extent of their use. To insist, for example, upon a certain amount of money per capita, is obviously unreasonable; no such arbitrary rule of measure is, in the nature of things, applicable. For example, in France, where the people use checks only sparingly, a per capita of nearly $40 appears necessary; in Great Britain, where the check system has reached its highest development, less than half that amount suffices; with us, where checks are used, but not in so great a measure as with the British, an amount between $25 and $30 per capita is still required. At certain seasons, as when crops are moved, a larger supply is necessary; when the period has passed, the continued existence of the added volume disturbs the price equilibrium, hence it should be withdrawn. A crude, and by no means complete, illustration of the operation is afforded by the transactions of a cotton factor who has advanced to the planter capital to gather his crops, and receives the cotton in payment. He proceeds to ship the textile to Liverpool, drawing his draft payable in, say, three months for the proceeds of the sale; this draft, with the ship's bill of lading attached, he takes to the bank for discount and obtains the bank's notes, with which (his replenished capital) he enters upon a new transaction. When the bank has received the amount of the draft on Liverpool it has its cash again in bank, and unless a new transaction presents itself, it should use this cash to redeem its notes and cancel them as they are presented or deposited with it. Thus the volume of its notes is regulated by the demand.

Statistics.— The statistics of note issues are of interest. Generally the information is confined to «uncovered paper,» a term used to designate notes issued in excess of coin; sufficient is known to indicate that the volume of notes at present in use in the world is approximately $6,000,000,000, one half of which is «covered.» For 1890 the amount of uncovered paper is given as $4,230,000,000, indicating a substantial increase in coin reserves made possible by the marked increase in the gold product since the latter date. To show how the currency of the principal countries was affected by this increase, it may be cited that while there were in use in 1873, $2,322,000,000 of uncovered notes, the figures for 1902, when the gross issue was greater, aggregated only $1,270,000,000. Adding to the large amounts thus reported the available bank-credit-money (capital and deposits of banks), which constitutes the fund against which checks and drafts are drawn and from which loans may be granted, it is found that the world had, in 1890, approximately $16,000,000,000 of both credit-money and bank-notes available; in 1908 the sum was stated to be $27,000,000,000.

Conclusion.— We have seen how in the evolution of civilization the need for a standard finally led to the adoption of that article which proved most serviceable for the purpose — gold; we have also seen that mankind was, in the long run, always impelled by the desire to reach, as nearly as was possible, a medium and standard that would prove honest and equitable; that in the choice of an auxiliary this rule of action has likewise governed. It is not impossible that both gold and bank-notes may in the course of the present century be superseded by other articles or devices better calculated to serve all the needs. A number of propositions looking to such an improvement have been presented and discussed, but none have thus far received the general approval of even the theorists. It is certain that any plan to supersede the existing forms of money must be demonstrated practicable beyond question, long before custom and habit of the people can be changed; for they, more than ever before in the world's history, appreciate the importance to their welfare of honest money, and the oppression, robbery, distress and desolation which dishonest money carries in its train.

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MAURICE L. MUHLEMAN,
Late Deputy Assistant United States Treasurer.

Money, Coin. See COINAGE; NUMISMATICS.

Money, Paper, a money issue of a nation or government; a stamped sheet of paper, silk, linen, or parchment, given an official value and used as a medium of exchange. Although coins were used before paper money, the latter was known among the ancients. Corn, cattle, iron, leather, cocoa, shells, tobacco, and other commodities were all, in point of fact, used as money, in different ages and different countries; but they have long ceased to be so used, by commercial nations, for reasons similar to those which have induced men to choose for their standard of length some object less liable to variation than the foot of a chancellor, or the fore-arm of a king. The high estimation in which the precious metals have been held, in nearly all ages and all regions, is evidence that they must possess something more than merely ideal value. It is not from the mere vagaries of fancy that they are equally prized by the Laplander and the Siamese. It was not from compliance with any preconceived theories of philosophers or statesmen, that they were for many thousand years, in all commercial countries, the exclusive circulating medium. Men chose gold and silver for the material for money for reasons similar to those which induced them to choose wool, flax, silk, and cotton for materials for clothing; and stone, brick, and timber for materials for building. The scarcity of gold and silver, the need of bills of exchange, and the want of a money more convenient for the individual to carry, and lastly, the issuance of government credits forced on bankrupt nations, brought about the use of paper money in European countries, and Colonial America early adopted this medium of exchange from the English.

Provincial Paper Money.—In the earliest days of America, paper money was first issued by Massachusetts in 1690. The object was not to supply any supposed want of a medium for trade, but to satisfy the demands of some clamorous soldiers. Other issues were subsequently made, partly with a view of defraying the expenses of government, and partly with a view of making money plenty in every man's pocket. The ill-judged expedition of the Carolinas against Saint Augustine, in 1702, entailed a debt of 6,000 pounds on that colony, for the discharge of which a bill was passed by the Provincial Assembly for stamping bills of credit, which were to be sunk in three years by a duty laid upon liquors, skins, and furs. For five or six years after the emission, the paper passed in the country at the same value and rate as the sterling money of England. To defray the expenses of an expedition against the Tuscaroras, and to accommodate domestic trade, the legislature of South Carolina established a public bank in 1712, and issued 48,000 pounds in bills of credit, called bank-bills, to be lent out on interest on landed and personal security, and to be sunk gradually at the rate of 4,000 pounds a year. Soon after the emission of these bank-bills, the rate of exchange and the price of produce rose, advancing in the first year to 150, and in the second to 200 per cent. By the year 1731 the rate of exchange rose to 700, at which it continued with little variation upward of 40 years. In the year 1723 the province of Pennsylvania made its first experiment of a paper currency. It issued, in March, 15,000 pounds, on such terms as appeared likely to be effectual to keep up the credit of the bills. It made no loans but on land security, or plate deposited in the loan office; obliged the borrowers to pay 5 per cent for the sums they took up; made its bills a tender in all payments, on pain of confiscating the debt, or forfeiting the commodity; imposed sufficient penalties on all persons who presumed to make any bargain or sale on cheaper terms in case of being paid in gold or silver; and provided for the gradual reduction of the bills, by enacting that one eighth of the principal, as well as the whole interest, should be annually paid. These early specimens of provincial paper money were large notes, printed from copper-plates, having engraved borders on three sides. The inscriptions on the bills were in type, with arms or motto engraved in the left side centre. The signatures of the province officials were always signed in red ink.

Continental Money.—The first issue of paper money under the authority of the Continental Congress was dated 10 May 1775, but the notes were not actually placed in circulation until the August following. On 31 May 1781, the continental bills ceased to circulate as money, but they were afterward bought on speculation at various prices, from 400 for one, up to 1,000 for one. The value of continental paper was not the same in different parts of the country. The exchange was, for example, at 35 for one in New England, New York, the Carolinas, and Georgia, and at 40 for one in Pennsylvania, New Jersey, Delaware, Maryland, and Virginia. An account taken from the books of merchants in Virginia shows that the depreciation there regularly followed that in Philadelphia, though, toward the close, it sometimes lagged a month or more behind. Thus when exchange was in Philadelphia at 100 for one, in January 1781, it was in Virginia at 75 for one. As late as May 1781, speculations were entered into at Philadelphia, to purchase continental money at 225 for one, and sell it at Boston at 75 for one. It is worthy of remark that the depreciation of continental money never stopped the circulation of it. As long as it retained any value at all it passed quick enough; and would purchase hard money or anything else, as readily as ever, when the exchange was 200 for one, and when every hope, or even idea of its being ultimately redeemed at nominal value had entirely vanished. The facility of raising ways and means, in the early part of the Revolutionary War, by issues of paper, led to much extravagance in the commissary department, and prevented the establishment of a sound system of finance. It is said that when a proposition was before Congress to establish a regular revenue system, one member exclaimed, "Do you think, gentlemen, that I will consent to load my constituents with taxes, when we can send to our printer and get a wagon load of money, one quire of which will pay for the whole!"

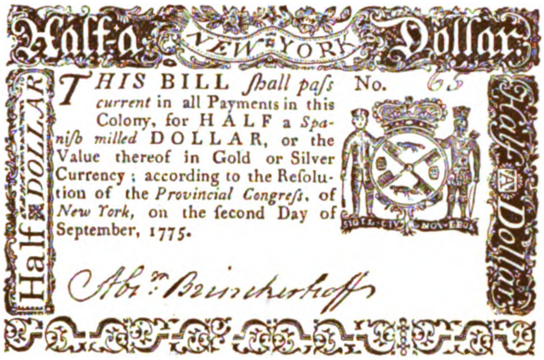
Connecticut.—Under date of 4 March 1762, Connecticut issued a series of colonial notes of the following values: 9 pence, 1 shilling, 2 shillings and 6 pence, and 10, 20, 30, and 40 shillings. There were 19 regular issues, the last being dated 1 July 1780. There were also three single bills in the nature of treasury notes, the last dated 26 Jan. 1791. Over 100 different bills were issued by this colony. The smaller values were for 2, 3, 4, 5, and 7 pence, issued 11 Oct. 1777. In Connecticut the 6 shilling bill was not infrequently raised by clever counterfeiters to the value of 10 shillings.

Delaware.—In this colony paper money was issued as early as 1735. One value only of these notes has been preserved to us, although doubtless many others were in circulation; the denomination is 10 shillings. The designs of the early issues are all about the same, a type body with a border of the same and wood cut of the royal arms. On 28 Feb. 1746, a new series was issued of the same general design, but noteworthy from having been printed by the celebrated Benj. Franklin and his partner D. Hall. On bills of this colony we first get the information that "To Counterfeit is Death," which is repeated in every possible form, "'Tis death to counterfeit," "To counterfeit is death," "It's death to counterfeit this bill," "Death to counterfeits," etc. The 2 shilling 6 pence bill of January 1776 issue is adorned with pillars, and probably to show that the edifice supported can stand any sort of usage, one is placed upside down. The last series issued, May 1777, contains bills from 3 pence to 20 shillings, and changed the cut of the royal arms for that of the State. Sixty bills emitted by this colony are known.

Georgia.—The earliest bill printed in Georgia was of the value of 2 shillings 6 pence, and was dated 7 March 1749. The Georgia bills were printed on one side of white paper and were usually made attractive by copper-plate vignettes printed in various colors. The vignettes represented figures of liberty, soldier, deer, hog, rattlesnake, palmetto tree, etc. The last issue was dated 16 Oct. 1786. There are over 110 varieties from 3 pence to 5 pounds.

Maryland.—The first bill of this colony is dated 1740 and of the value of one shilling.

AMERICAN COLONIAL PAPER MONEY.



Half a NEW YORK Dollar

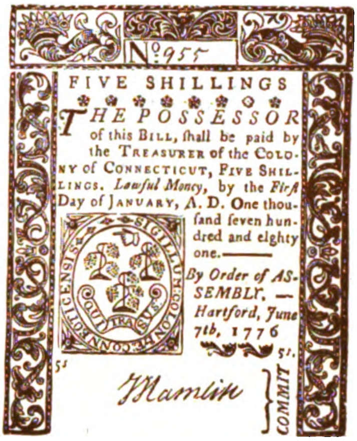
THIS BILL ſhall paſs current in all Payments in this Colony, for HALF a Spaniſh milled DOLLAR, or the Value thereof in Gold or Silver Currency; according to the Reſolution of the Provincial Congreſs, of New York, on the ſecond Day of September, 1775. No. 65

Half DOLLAR

Half A Dollar

Abr.m Brinckerhoff

1



№ 955

FIVE SHILLINGS

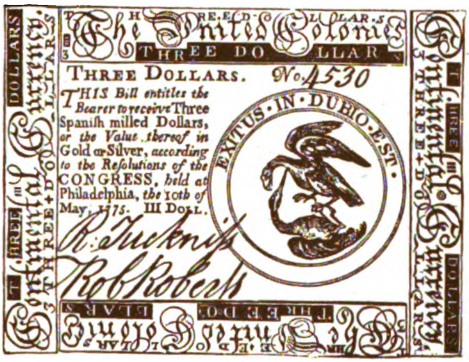
THE POSSESSOR of this BILL, ſhall be paid by the TREASURER of the COLONY of CONNECTICUT, FIVE SHILLINGS. Lawful Money, by the Firſt Day of JANUARY, A. D. One thouſand ſeven hundred and eighty one.——

By Order of ASSEMBLY. — Hartford, June 7th, 1776

5s. 5s.

J Hamlin } COMMIT

2



The United Colonies THREE DOLLARS

THREE DOLLARS. No. 4530

THIS Bill entitles the Bearer to receive Three Spaniſh milled Dollars, or the Value thereof in Gold or Silver, according to the Reſolutions of the CONGRESS, held at Philadelphia, the 10th of May, 1775. III DOLL.

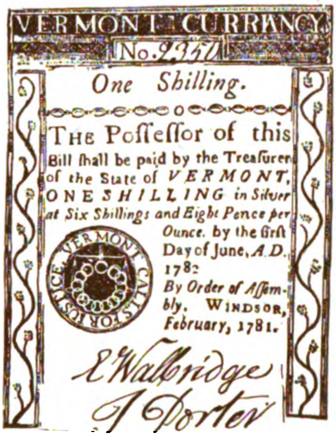
EXITUS · IN · DUBIO · EST ·

Continental Currency THREE DOLLARS

R: Tuckniss

Rob Roberts

3



VERMONT CURRANCY

No. 2357

One Shilling.

THE Poſſeſſor of this Bill ſhall be paid by the Treaſurer of the State of VERMONT, ONE SHILLING in Silver at Six Shillings and Eight Pence per Ounce, by the firſt Day of June, A.D. 1782

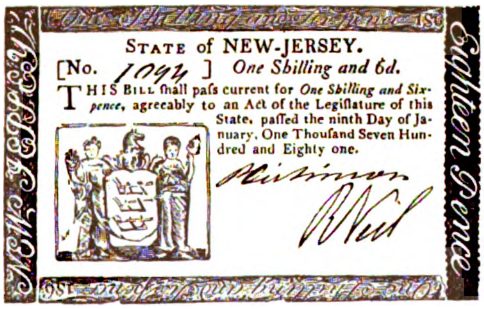
By Order of Aſſembly. WINDSOR, February, 1781.

VERMONT CALLS FOR JUSTICE

E Walbridge

J Porter

4



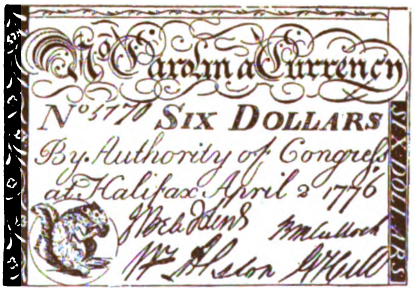
STATE of NEW-JERSEY.

[No. 1094] One Shilling and 6d.

THIS BILL ſhall paſs current for One Shilling and Sixpence, agreeably to an Act of the Legiſlature of this State, paſſed the ninth Day of January, One Thouſand Seven Hundred and Eighty one.

Eighteen Pence

5



No Carolina Currency

No 5770 SIX DOLLARS

By Authority of Congreſs at Halifax April 2 1776

SIX DOLLARS

6

1. New York Province Half-dollar. 1775.
2. Connecticut Colony 5 shillings. 1776.
3. U. S. Continental Currency, \$3 1775.
4. Vermont State Currency, 1 shilling. 1781.
5. New Jersey State Currency. 1 s. 6 pence. 1781
6. North Carolina Currency, \$6. 1776.

Univ. Library, UC Santa Cruz 2001

This was followed by a series of five values in 1748 and from then a regular succession of issues until their final extinction in 1781. The design of the early issues may be described as the arms of Lord Baltimore supported by two men in the costume of the day, one with a fish and the other with a spade. This is differently placed on the various bills. The lettering or form of contract is in the following words, "This indented Bill of Eight Dollars shall entitle the bearer to receive Bills of Exchange payable in London, at the Rate of Four Shillings and Six Pence Sterling per Dollar for the said Bill, according to Directions of an Act of Assembly of Maryland, Dated in Annapolis, this 1st day of January, Anno Domini 1767," followed, of course, by two signatures. The quaint idea of scalloping the end of a legal document to show that it has been prepared with due care and thought, and not cut off in a hurry, is carried out on these bills. In some values even the word "indented" is printed in a wavy line, and that there should be no mistake as to what is meant by a dollar, a minute representation of a Spanish dollar is inserted in the text. The values of the Maryland bills were 3, 4, 6 and 9 pence, and so on up to 3 pounds. There were over 100 varieties issued.

Massachusetts.— Prior to 1775, some 13 examples of paper money were issued in this colony. One of these is a copper-plate engraving said to have been the work of the noted patriot, Paul Revere, of Boston. The series was issued by order of the General Assembly of the Colony of Massachusetts Bay, 7 Dec. 1775. The reverse of these bills bears the figure of a man in continental dress, with a drawn sword in one hand and a copy of the Magna Charta in the other, above "Issued in defence of American Liberty," below in Latin, "He seeks by the sword calm repose under Freedom." The series of 16 Oct. 1776, repudiates the title of Colony for that of State. Coin must have become scarce, as more than half of the denominations are under 1 shilling. The codfish was the principal design on these bills. The next issue of eight values was of interest-bearing notes which are guaranteed by the United States. Upward of 135 bills were issued by Massachusetts.

New Hampshire.— The design of the New Hampshire bills was usually the British arms with inscriptions in elaborate frames. The earlier issues were type-set. About 60 varieties are known.

New Jersey.—The issues in this colony began in March 1724 and continued regularly to May 1786. In shape the bills were a small, narrow oblong. The high value notes were printed in blue and red. In 1781, the royal arms became the arms of the State, the type reading as follows: "State of New Jersey, Five Shillings, This bill shall pass for Five Shillings agreeably to an Act of the Legislature of this State, passed the ninth day of January, One Thousand Seven Hundred and Eighty-one." An entire collection of New Jersey bills would number 185.

New York.—The first bill issued was in 1709, and then followed a series of four dated 18 Dec. 1737. In the next issue the form reads "By a Law of the Colony of New York this Bill Shall Pass current for Three Pounds New York the 20th April 1756." A set of United States guaranteed notes appeared 15 June 1780.

North Carolina.—The earliest notes were dated 1748, and upward of 120 varieties were printed up to 1780. The most of the North Carolina bills bore motto inscriptions, such as "Virtuous Councils the Cement of States"; "A Righteous Cause the Protection of Providence"; "A Lesson to arbitrary Kings and wicked Ministers"; "Liberty and Peace the Reward of Virtuous Resistance"; "Persecution the Ruin of Empires"; "Union of Hearts the Strength of Interests"; "American Virtue Triumphant," etc.

Pennsylvania.—The earliest known bill was dated 10 Aug. 1723, and was printed by Benj. Franklin. The general style of the notes is the same as used in Delaware, bearing the royal arms, or in 1756 those of Wm. Penn, with his motto, "Mercy Justice." In 1764 a curious notion was adopted of spelling the name of the colony differently on each bill, thus on the series we find Pennsylvania, Pensylvania, Pennsilvania, and Pensilvania. On some of the notes issued in 1771 is the signature of Francis Hopkinson, and on the bills of April of the following year that of John Morton, both signers of the Declaration of Independence. In 1777 the shape of the bill changes to the oblong form, and the arms of Pennsylvania take the place formerly devoted to those of Great Britain. This series are found both in black, and red with black type. In 1780 a set guaranteed by the United States, of the same design as issued for other States, was put in circulation, and on 16 March 1785, the last of the series saw the light, the denominations running from 3 pence to £4, 16 values in all. The varieties issued by this colony were over 250.

Rhode Island.—The paper money of Rhode Island was similar in design and value to that of Connecticut. The first issue was in 1715 and the last in 1786. There were about 75 varieties.

South Carolina.—There were various notes issued in this colony from 1712 to 1770. The bills dated 6 March 1776 were supposed to have the value of silver, equivalent in currency is given thus, 6 Spanish milled dollars = £9 15s. currency. In 1779 appeared the handsomest notes heretofore used in the country, the backs of the $50, $70 and $90 bills representing Atlas, Prometheus and Hercules being especially noteworthy. The total number of bills for South Carolina was 105.

Vermont.—In this colony there were but two series, the first issued in February 1781 is an ordinary type-printed note, with engraved border on three sides with the state seal about the centre. This consists of a pair of scales and a chain of fourteen links (the only instance where the number is carried above the original thirteen) enclosed in a circular band inscribed "Vermont Calls For Justice." The second issue are in the form of treasury notes, the amounts being filled in with ink.

Virginia.— The first issue for this State was in 1755. The notes are of two varieties, the first a fine, large bill after the English style, and then something between a draft and a bank-bill, being probably made to fill a pressing want. The bills are copper-plate engravings filled out in ink. On the issue of 1775 are the royal arms of Virginia in an engraved frame. The lettering reads, "Three Pounds Current Money of Virginia Pursuant to Ordinance of Convention

Passed 17 July 1775.» The following year introduces the «sic semper tyrannis» in place of the arms.

Bank Notes.—From the Revolutionary period to the days of the Civil War and to the present time, many issues of paper money have been made by the government, and by national, state and local banks. (See BANKS AND BANKING.)

Confederate Paper Money.—During the Civil War the Southern States in secession issued millions of dollars in paper money, beginning in July 1861, with bills of from $5 to $100. On these were designs of the Confederate flag, a train of cars, cotton bales, etc. In September 1861, appeared at least 50 varieties of bills in value from $5 to $100. They were of various designs. A $20 bill showed a head of Alexander H. Stephens in one corner; a $10 bill pictured General Marion offering a breakfast of sweet potatoes to a British officer. Portraits of Davis, Hunter, Memminger, Stephens, Mrs. Pickens, Mrs. Davis, Benjamin, Gen. Jackson, and others, appeared on the high value notes. There was an issue of $1 and $2 bills in 1862 and in April 1863, appeared a series in value from 50 cents to $100. Some of these bore designs of the capitol buildings at Richmond, Nashville, Montgomery, etc. The last issue of bills from 50 cents in value to $500 appeared 17 Feb. 1864.

Postal Currency.—The United States government printed a paper money as a substitute for fractional currency during the Civil War, owing to the scarcity of silver. This was invented by General Spinner, United States Treasurer under Lincoln, and was commonly known as «shin-plaster» money. The issue was in small scrip of the denominations of 3, 5, 10, 25 and 50 cents. It disappeared from general circulation about 1870.

Greenbacks, Silver and Gold Certificates.—The more recent issues of American paper money in circulation at the present day are printed at the Bureau of Engraving and Printing at Washington. The engravers are specialists, and the figures and intricate designs of their work are often marvels of artistic skill. Portraits of living persons are never put on the notes, and all the figures, vignettes, borders, etc., are engraved separately before they are put on the plates. First the engraver works out his design, and after transferring it by hand to a plate of soft steel the plate is hardened and a soft steel roller takes the impression from it. After this roll is chilled another impression is taken on another steel plate, and after this latter has been hardened it is ready for use. The geometric lathe which makes the border is a complete and wonderful piece of mechanism. The lines for the borders, backs and other conventional designs seen on the notes are made by this machine. The paper for printing the bank-notes is manufactured under the supervision of government officials. It has two perpendicular lines of short, uneven silk threads running through it.

Foreign Paper Money.—The notes of the Bank of England are 5 by 8 inches in dimensions, and are printed in black ink on Irish linen water-lined paper, plain, white, with ragged edges. The notes of the Bank of France are made of white water-lined paper, printed in blue and black, with numerous mythological and allegorical pictures. South American currency is about the size and appearance of the American. The German notes are printed in green and black. The Chinese paper money is in red, white and yellow, with gilt lettering and various devices. Italian notes are printed on white paper in pink, blue, and carmine, and ornamented with a vignette of King Humbert.

WILL M. CLEMENS,
Editorial Staff, 'Encyclopedia Americana.'

Mon'eywort, Creeping Charley, Creeping Jenny, or **Herb-twopence,** are popular names for *Lysimachia nummularia* of the primrose family. The plant, which is a native of Europe, is a perennial with roundish leaves and axillary flowers borne from early summer until autumn. It is very popular for planting in rookeries, vases, hanging-baskets and shady situations, and has become naturalized in the eastern United States. Propagation by seeds or cuttings is very simple, and the plants seem to thrive in any moist, shaded garden soil, cool greenhouse, or window. Several other plants are sometimes called moneywort; for example, *Anagallis tenella, Dioscorea nummularia,* and *Thymus chamædrys.* See LOOSESTRIFE.

Mon'fort, Francis Cassatt, American Presbyterian clergyman: b. Greensburg, Ind., 1 Sept. 1844; d. 1 Feb. 1906. He was graduated from Wabash College in 1864, studied theology and after entering the ministry held Presbyterian pastorates in Cincinnati, 1869–88. Since 1873 he has been editor of the 'Herald and Presbyter.' He has published 'Sermons for Silent Sabbaths' (1887); 'Socialism and City Evangelization' (1887); 'The Law of Appeals' (1893); 'Ecclesiastical Discipline' (1900).

Monge, Gaspard, gäs-pär mônzh, French mathematician and physicist: b. Beaune, France, 10 May 1746; d. Paris 18 July 1818. He was educated at Beaune and Lyons and at 16 was a teacher. He made rapid progress and some valuable discoveries in engineering, and in 1783 was called to the professorship of hydrodynamics in the Paris Lyceum. He was a supporter of the French Revolution, became minister of marine and was temporary minister of war and one of the signers of the death warrant for Louis XVI. He resigned soon after the king's death and was engaged in manufacturing arms and gunpowder for the army. He founded the Ecole Polytechnique under the Directory and was professor of mathematics there, but was later sent to Italy to assist in the removal to France of the art treasures captured by French armies, and there gained the friendship of Napoleon whom he accompanied to Egypt in 1798, continuing his scientific researches. He resumed his position in the Ecole Polytechnique upon his return to France and in 1805 was elected senator. Napoleon gave him an estate in Westphalia, and the title of Count of Pelusium, but the downfall of the emperor resulted in reverses for Monge who was expelled from his positions in 1815. He published: 'Traite élémentaire de Statique' (1788); 'Leçons de Géométrie Descriptive' (1795); etc. Consult: Dupin, 'Essai Historique sur les Services et les Travaux Scientifiques de Monge' (1819); Obenrauch, 'Monge der Begründer der darstellenden Geometrie als Wissenschaft' (1893–4).

Monghyr, mŏn-gēr', or **Monghir,** India, the capital of a district in the Bhagalpur division of Bahar, Bengal, on the right bank of the Ganges, 80 miles east of Patna. It communicates by a steam ferry with its railway depot on the opposite bank. It is of great antiquity, and has an elevated fort, enclosing the district administrative offices. Monghyr still enjoys a local reputation for its former important manufactures of swords, firearms and hardware. Pop. (1901) 35,883.

Mongo'lia, Asia, a vast central and eastern region belonging to the Chinese empire, between lat. 35° and 52° N., and lon. 82° and 123° E., bounded on the north by Asiatic Russia, east by Manchuria, south by China proper, and west by Sungaria and East Turkestan; estimated area, about 1,300,000 square miles.

The central portion, nearly a fourth of the whole, is occupied by the Desert of Gobi, an extensive sandy plateau, with a few spots of pasture and brushwood. Other parts are intersected by lofty granitic chains, the principal of which are the Altai, the Thian-shan, the Khinghan, and the In-shan. The largest rivers are — in the north the Salenga, and in the south the Siramuren. The climate presents the opposite extremes of intense winter cold and summer heat. Agriculture is but little developed, and that only in the south on the borders of China proper; cattle raising, a few domestic industries, and the transporting of goods are the chief occupations of the inhabitants. There is a considerable transit trade with Russia and China; the principal commercial centres are Kuku-Khoto, Kalgan, Biru-Khoto, Dolon-nur, and Kuku-erghi, in southern and southeastern Mongolia; Kerulen in the northeast, Kobdo, Ulasutai, and Urga in the northwest. The population is estimated at about 3,000,000, divided into tribes chief of which are; (1) the Khalkas, or Mongolians properly so called, who occupy the entire north of Mongolia; (2) the Ouryantai and the Darkhat, who are Mongolized Turks; (3) the Ordos of pure Mongolian blood; (4) the eight tribes of the Tsaktar, of Mongolian blood.

The Khalkas are divided into four «aïmaks,» or principalities, the creation of which, it is said, dates back to Genghis-Khan. These are Toucheton, Tsetsen, Saïn-Noïn, and Tsatsatkou. Each aïmak is divided into «hoshuns,» which are subdivided into «sumuns.» Such distribution of the territory is very ancient.

Although the Mongolians are vassals of China they govern themselves. In each administrative subdivision there is elected a chief, whose election is ratified by the Chinese government, and who receives from Peking a title of honor of slight importance, along with a button or peacock's feather for his cap. At Osuga, the Mongolian prince in charge (theoretically) of the administration of the affairs of the Khalkas has for adjunct (theoretical) a Manchu envoy, the «ambane,» who is really the master of the situation; and the decisions made in common (or that are supposed to be) by the two exalted persons are those dictated by the ambane, that is to say, the Peking government.

The Khalkas are nomads, but only relatively so. Within the limits of their hoshun and sumun they periodically shift their quarters in search of «pastures new» for their herds, but they never travel very far, and it is always possible to find an encampment within a radius of a few miles.

They live under the «yourte,» which consists of a light circular framework covered with pieces of felt. The form is that of a dome supported by a small sub-basement, and about 10 feet in height. In order to render it habitable, it suffices to cover it with pieces of felt and close the central orifice above with a movable piece of the same material. Through this orifice the smoke of the «*pot à feu*» escapes. The fire place is situated in the centre of the abode, the household gods are placed opposite the door, and the housekeeping utensils are arranged along the walls. Around the fireplace are spread out, in lieu of seats, pieces of felt, for which the well-to-do substitute carpets. The princely yourtes are furnished with board floors and decorated with silken hangings.

In summer the men wear wide trousers and a shirt of calico, in most cases blue. Over this they place a long robe, which is buttoned upon the shoulder and side. This is of blue or brown cotton, but sometimes of red or dark green silk. The lamas, or church people — the religion being Buddhism — affect yellow. This robe is gathered in at the waist by a cloth girdle whence, to the right, hangs a knife, and to the left a tobacco bag and tinder box.

Boots with pointed upturned toe and high heel, generally of red leather with a thick sole, complete the accoutrement. The fact that the Mongolian shoemakers make but one size of footgear explains why the son can wear the boots of his father, and why the Mongolian (who also is naturally lazy) does not like to take even the shortest walks afoot. He bestrides his horse in order to travel a distance of a hundred paces, and it is only during the coldest weather that he decides to dismount from his steed in order to walk half a mile or more.

The Mongolians shave and wear a cue. The headgear or national hat consists of a small cone of figured silk or damask, which forms the skull-cap. The rim, which is of black velvet, is turned up so as to describe an acute angle with the central cone. Behind, float two long wide ribbons, which are invariably of red silk. The button or the tuft that crowns the cone is likewise always red. When it rains (a rare event in the Khalka country) the velvet rim is turned down, and the hat assumes the form of an extinguisher that protects the ears and neck. In winter, these hats are replaced by a headgear trimmed with fur, squirrel among the poor, and sable among the rich, the change of hat is accompanied with a change of costume. The long cotton or silk tunic is replaced by a mantle of sheep or deer skin, or among the rich, by a long coat of silk trimmed and lined with costly fur.

The majority of the Mongolians are thin and emaciated. Although they are not strong, they are wiry and capable of withstanding considerable fatigue on horseback. But they object to muscular work. It takes two or three to lift a weight that could be easily handled by one Cossack. To the European eye, they are, with their broad, flat noses, their high cheek-bones, and their little, beady eyes, intensely ugly. They are generally of a low stature, and sometimes have a certain nobility of countenance. Almost all have a kind, benevolent expression to which one soon becomes habituated.

In their youth, the women are very prepossessing. Their lineaments are refined, their eyes languishing, and their faces plump and smiling like those of the Japanese. They wear the same underclothing that the men do; the same boots and the same hat. But the married women wear a long tunic with very narrow sleeves that are generally red from the middle of the arm to the wrist, which is covered by a small point of the sleeve, if the latter is not rolled up. The robe may be blue, brown, violet, or red, but the sleeve is always red. Above the shoulder the sleeve is padded to a considrable height. A tucker of this same red color covers the top of the throat.

Maidens, whose robes resemble those of men, wear their hair in a single braid hanging down the back. The children go about bravely *in puris naturalibus,* during the summer season, and it is not till they have reached the age of 10 that they are clad in the long national tunic.

The name of the Mongolians became suddenly known in the 13th century, and the world was soon filled with the narratives of the exploits of these nomad warriors. The celebrated chief known to history as Jenghis-Khan (or Genghis-Khan) was born probably in 1162. By his ardor, courage, and successes, he grouped around him a band of young warriors, took part in a number of wars between the Chinese and Mongolians, fighting now on one side and now on the other, subjugated all the tribes living between Irtych and the Khingan Mountains, and in 1206, at the diet of the Mongolian nobles that he had assembled, received the title of Jenghis-Khan, or «the most powerful prince,» under which he was to be known to posterity. Marching from conquest to conquest, he soon became master of the southern provinces of China, and in 1210 made himself master of Bokhara and Samarkand. Seven years later, he died, while his army divided into three parts, one of which marched against Afghanistan, another against Russia, and the third completed the conquest of China.

In 1237 the whole of Russia, except Novgorod, was paying tribute to the Mongolians, who next invaded Poland and Silesia, and finally Moravia and Hungary. At this period the power of the Mongolians was at its apogee; but, at the end of the 13th century, it declined, and in 1368 these people were driven from China, and the prince who had occupied the Chinese throne returned to the steppes of the north, with his vassals, where he reigned over his fellow countrymen only. A century later, the Mongolians were beaten and dispersed by the Russians, who had been their vassals for two centuries.

Subsequently, the Khans of southern Mongolia acknowledged themselves vassals of the emperor, Son of Heaven, the «Bogdo-Khan.» Northern Mongolia, that is to say, the country of the Khalkas, divided into four principalities, remained independent for a longer time, but in 1691 placed itself under the protection of the emperor of China.

Consult: Gilmour, ‹Among the Mongols› (1883); Pozdnéef, ‹Towns of North Mongolia› (1880); ‹Mongolia and the Mongols› (1896–9); Prjevalsky, ‹Mongolia and the Land of the Tanguts› (1875–1883–1888).

Mongo'lian Race, a general name applied to a majority of the people of Asia. In ethnology, the term is used for one of the five great races of the world discriminated and named by Blumenbach, and adopted by Cuvier when he reduced Blumenbach's five to three. The head of the Mongolian is square; the face flattish, nearly as broad as long, the parts not well distinguished from each other; the eyelids narrow, obliquely turned up at their outer angle; the space between the eyes flat and broad, the nose flat, the cheeks projecting, the chin somewhat prominent. The hair is straight, the color black, that of the face and body yellowish (sometimes inaccurately called olive, which implies an admixture of green). The race includes not merely the natives of Mongolia properly so called, but the Tartars, the Chinese, the Japanese, the Cochin Chinese, the Burmese, the Tamuls, the Turks, and the Finns.

Mongolian Subregion. In zoogeography, a subdivision which includes the tablelands of central Asia, from the Caspian Sea to Japan. Its separation from other Asiatic faunal regions is mainly on ornithological grounds, and is neither distinct nor important.

Mon'goose, Monguse, etc. See MUNGOOS.

Mon'ica, Saint, mother of Saint Augustine (q.v.): b. Africa 332; d. Ostia 387. A Christian who, in accordance with the wishes of her parents, also Christians, married a pagan. She devoted nearly all her life to the conversion of her husband and son Augustine. Her self-sacrifice was at last rewarded; her husband, Patricius, became a Christian, and Augustine, seeing the error of his ways, reformed. After the baptism of Saint Augustine at Easter, 387, she set out with her two sons for Africa. Arriving at Ostia she became ill and here died. A friend asked her in Ostia if she were not afraid to be buried in a place so far from her own country. She replied: «Nothing is far from God.» Her eminent son preserved many of her holy sayings which he often repeated in his sermons. In the Roman Catholic Church she is regarded as the model and patroness of wives and mothers. Her feast is 4 May. Consult: ‹Saint Augustine's Works› edited by Tillemont; Butler, ‹Lives of the Saints.›

Monier-Williams, mō'nĭ-ėr-wĭl'yamz, **SIR Monier,** English Sanskrit scholar: b. Bombay 12 Nov. 1819; d. Cannes, France, 11 April 1899. He was a son of Monier-Williams, surveyor-general. He was educated at Oxford, and was for a short period a student at the East India College, Haileybury. He was professor of Sanskrit at Haileybury from 1844 to the extinction of the college in 1858, and in 1860 became Boden Sanskrit professor at Oxford, a post which he held till his death. Among his numerous works are: ‹Practical Sanskrit Grammar› (1846); ‹English-Sanskrit Dictionary› (1851); edition with notes, translations, etc., of the Sakuntalā (1853); ‹Introduction to Hindustani› (1858); ‹Indian Epic Poetry› (1863); ‹Sanskrit-English Dictionary› (1872, 2d edition 1899); ‹Indian Wisdom› (1875); ‹Hinduism› (1877); ‹Modern India and the Indians› (1878); ‹Religious Life and Thought in India› (1883); ‹The Holy Bible and the Sacred Books of the East› (1886); ‹Brahmanism and Hinduism› (1889); ‹Reminiscences of old Haileybury College› (1894). He traveled extensively throughout India in order to study the native religions, and to further his scheme of an Indian institute, which he succeeded in getting established at Oxford.

Monism, a philosophical term which may be briefly translated by «doctrine of unity.» (See DUALISM and PLURALISM.) The word was coined by Christian von Wolff, a German philosopher of the first half of the 18th century, and is derived from the Greek μόνος which means «single; alone; lonely; unique; existing in only one copy.» Wolff, the inventor of many happy terms that acquired currency in philosophy, introduced the word to characterize such philosophies as recognize the existence of one ultimate form of reality only, be it spirit or matter, and he contrasted it with «dualism,» that is, the doctrine of duality, held by all those thinkers who believe that both spirit and matter are ultimate forms of existence. Kant had been raised in the school of Wolff's dogmatism and adopted his nomenclature but did not use the word «monism,» and so it happened that the term remained dormant for more than half a century. Besides there was no one who would label his own views as monism, as defined by Wolff.

However, the better the interconnection of all things began to be understood, the more was the idea of unity appreciated. A new term was needed and the word «monism» was too expressive to remain neglected. Kant had left a method, but his successors endeavored to work out systems of philosophy, and everyone of them tried to discover the oneness of existence in his own way. Fichte established it in his doctrine of the all-sufficiency of the ego by showing that the objective world is derived from the ego and is in part the expression of the nature of the latter, and in part the necessary condition of its realization and development. Thus Fichte makes the assumption that the subject is the one and the all. Schelling tried to avoid Fichte's error and founded his theory of oneness upon the identity of the subject and the object. Hegel, however, discovered the unity of the world in the object in itself which was neither the object nor the subject, but a higher third power which he called the Absolute, manifesting itself according to its own laws in the phenomenal world of both subject and object. Hegel's philosophy was characterized as monism, and he pointed out how all thought consisted in the search for a higher unity in a contrast of two opposites.

The word «monism,» however, began to be prominently applied at the time when Darwinism gained the ascendency, and now the naturalists among the philosophers, men strongly influenced by Spinoza, who denied any special revelation and rejected the dualism implied by the belief in a miracle-working extra-mundane creator, adopted the name as an appropriate description of their own views. Spinoza's philosophy was praised by them as a consistent monism, and most of them assumed with their master (Spinoza) that there is one substance only and that this one substance manifests itself in two modes of existence, as thought and extension.

Modern psychology is built upon Spinoza's conception of the correlation of thought and extension. It conceives of subject and object, of soul and body, of spirit and matter, of feeling and motion, as a contrast based upon an ultimate unity. From this principle Weber and Fechner developed their theory of parallelism which was further elaborated by their successors and was brought to a relative completion by Wundt. In England Prof. W. K. Clifford gave it a classical expression in his essay on the ‹Nature of Things in Themselves.›

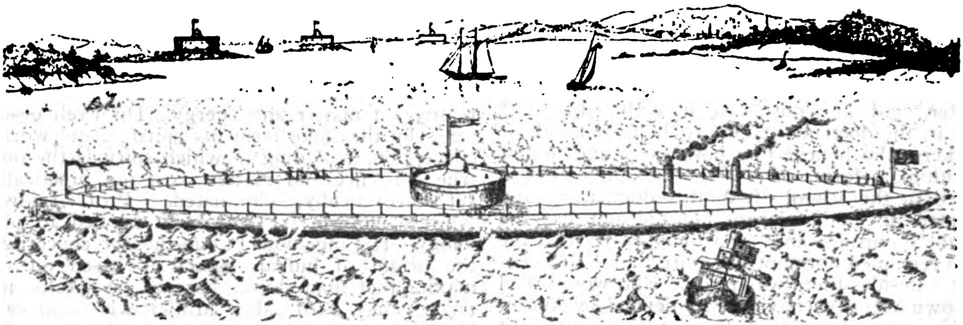
In this way monism gradually acquired the repute of denoting a philosophy that, as a matter of principle, was in strict harmony with scientific methods, and thereby the meaning of the word was again slightly changed; for it denoted no longer a «one substance theory» but any philosophy that in one way or another sought to establish an ultimate unity of some kind. Thus, Prof. Haeckel's monism is a naturalism according to which there is no other reality but matter and energy. Du Prell designates by the same term his spiritualistic world-conception, according to which spirit is the only true existence and matter is, if not practically, yet theoretically, eliminated. Prof. Ludwig Noiré's monism is Darwinism applied to philology. His ingenious «Logo-theory» concerning the origin of human speech is based on the maxim that man thinks because he speaks, not *vice versa.* Prof. Max Müller who also calls himself a monist, follows Noiré closely in his monistic interpretation of reason and boldly proclaims the theory of «the identity of language and thought» but shrinks from drawing the last consequence of Darwinism as to the descent of man. The writer understands by monism, «a unitary world-conception» and defines its underlying principle simply as «consistency.» To him monism is identical with a genuine positivism (a philosophy built upon the facts of experience) and may briefly be characterized as «the philosophy of science.» It is the aim of philosophy to justify the methods of science that everywhere lead to the conception of oneness. All truths must agree; there may be contrasts, but there cannot be any contradiction in truth. Any dualistic conception indicates that there is a problem to be solved and the establishment of monism is everywhere the final aim of all science. Consult: Bradley, ‹Appearance and Reality› (1897); Hobhouse, ‹Theory of Knowledge› (1896); Avenarius, ‹Der menschliche Weltbegriff›; Romanes, ‹Mind Motion and Monism.›

PAUL CARUS,
Editor of ‹The Monist.›

Moniteur, mō-nē-tėr, **Le,** French journal, established 5 May 1789 by Panckoucke under the name ‹Gazette Nationale, ou le Moniteur Universel.›

Monitite. See MONETITE.

Monitor, The, an ironclad, the first of a class of naval vessels designated as monitors (see WARSHIPS). It was designed and built for the United States government in 1861–2 under direction of the engineer John Ericsson (q.v.), who adopted as the most essential feature of its construction the revolving gun-turret devised by the American inventor Theodore Ruggles Timby (q.v.). The Monitor was launched at Greenpoint, L. I., 30 Jan. 1862, only 100 days after the laying of her keel. She put to sea 6 March following, under command of Lieut. John L. Worden (q.v.), arriving on the night of the 8th at Hampton Roads, Va. Extraordinary energy had been displayed by the builders to meet a grave emergency of the government, then weak in naval resources, for making effectual the blockade of Southern ports which President Lincoln had proclaimed, as well as for aggressive action and coast-defense. This emergency soon became a dire peril which threatened the destruction of the Union through superior sea power acquired by the Confederacy with foreign aid or connivance. How this danger was first averted is shown in the account of the famous action in Hampton Roads (see MONITOR AND MERRIMAC).



Theodore R. Timby's Model sent to China by Caleb Cushing in 1843, which suggested to J. Ericsson the Low Freeboard.

The Monitor was built by a company of men, John F. Winslow and John A. Griswold of Troy, N. Y., and their associates, who were actuated by patriotic motives. With T. R. Timby, who had taken out patents «for revolving towers for offensive or defensive warfare whether placed on land or water,» they entered into a contract for the use of his inventions covering the revolving turret, paying him $5,000 as royalty on each turret constructed by them. They built the Monitor at their own risk, Winslow and Griswold furnishing 90 per cent and C. S. Bushnell of New Haven, Conn., 10 per cent of the cost. Ericsson, for his services as engineer, received 5 per cent of the gross sum paid to the company for the Monitor and kindred vessels built by them. A contract with the government was made by the company and Ericsson, and the government paid for the Monitor $275,000, the actual cost being $195,000.

Ivory model of the turret made by T. R. Timby in 1841; now in possession of the Patriotic League of the Revolution.

The contract with the government provided for the building of «an iron-clad, shot-proof steam battery of iron and wood combined,» and the hull of the Monitor was of iron with wooden deck-beams and side-projection. Her dimensions were:

Extreme length	172 ft.
Extreme breadth	41 ft. 6 in.
Depth of hold	11 ft. 4 in.
Draft	10 ft. 6 in.
Inside diameter of turret	20 ft.
Height of turret	9 ft.
Thickness of turret	8 in.
Thickness of side-armor	5 in
Thickness of deck-plating	1 in.
Diameter of propeller	9 ft.
Diameter of steam cylinders (two)	36 in.
Length of stroke	2 ft. 2 in
Displacement	1,255 tons.

Armament, two 11-in. shell-guns, each 15,668 pounds.

In all the models, drawings, and plans of his invention made by T. R. Timby himself, the pilot-house or «lookout» was placed on top of the turret. «For some inexplicable reason,» he has said, «the Monitor had her pilot-house placed upon the deck, forward of the turret, in the way of her own guns.»

The success of the Monitor aroused much interest in all maritime nations, and was the direct cause of many modifications in the construction of vessels in the navies of Europe, though nowhere except in the United States navy was the monitor adopted as a distinct type of warship. During a gale off Cape Hatteras 31 Dec. 1862, the Monitor was sunk.

JOHN H. CLIFFORD.

Monitor and Merrimac. The contract for the construction of the Monitor was entered into by the Navy Department in the hope that she could be completed before the Merrimac, then building by the Confederates at the Norfolk Navy Yard, could be finished, and that the Monitor would be able to cope with this formidable ironclad. The Merrimac, called by the Confederates the Virginia, was being reconstructed upon the hull of the United States frigate Merrimac, of 3,200 tons, which had been sunk, when the Norfolk Navy Yard was abandoned, by the Union forces, and was subsequently raised by the Confederates. Her armament was two 7-inch rifles, two 6-inch rifles, and six 9-inch smoothbores.

Each side was aware of the effort of the other to be first ready for active service. The Confederates won by a day. At noon 8 March 1862, the Merrimac, attended by two gunboats, Raleigh and Beaufort, each one gun, was discovered coming out of the Elizabeth River into Hampton Roads (q.v.) and standing toward the Union fleet off Newport News and Fort Monroe, composed of the steam-frigates Minnesota, Roanoke, and Congress, each 50 guns; the sailing-frigate

St. Lawrence, 12 guns; and the sloop Cumberland, 24 guns. Their armament was mainly 8-inch and 9-inch guns, with several 10-inch pivot guns. These vessels had the heaviest batteries which the government had been able to assemble to watch the Merrimac. The latter bore down directly upon the Congress and Cumberland. At less than a quarter of a mile the Congress delivered her broadside, her heaviest shot making no impression. The return-fire of shells crashed through her sides with terrible effect. Passing the Congress at 300 yards, the Merrimac received the fire of the heaviest guns of the Cumberland without the slightest harm resulting, and without replying she drove her iron prow through the side of the Union frigate, crushing it, and at the same time pouring in a fire of shells. Leaving the Cumberland rapidly sinking, the ironclad steered for the Congress, which had been run ashore, and from a point 150 yards astern raked her decks with shells which caused general destruction and set the ship afire. The Congress was obliged to surrender. The Cumberland fired a broadside as the water reached the gun-deck, and went down with her flag flying. As she sank, the Confederate steamers Patrick Henry, 12 guns, and the Jamestown, two, came out of the James River and joined the Merrimac. The Minnesota had grounded where the Merrimac could not approach within a mile, and her firing was so bad that only one shot struck the frigate. The other Confederate vessels were finally driven off after inflicting much damage with their rifled guns. After several hours' ineffectual attempts to reach the Minnesota, the Merrimac and attending gunboats returned to Norfolk. Several shore-batteries which had attempted to help proved as useless as the batteries of the frigates had been. The Congress continued to burn, and finally blew up. Over half the crew of the Cumberland were lost. The crew of the Congress were made prisoners, but, with the exception of the officers, were released. The total loss was some 250, the Confederate loss was nominal. The battle of an afternoon had ended the day of wooden navies.

The reports of the destruction by the Merrimac caused consternation at Washington, and in the coast cities and, indeed, throughout the North. Secretary Stanton ordered all preparations made for obstructing the channel of the Potomac far below the capital, and warned those in charge of coast-defenses to use every means that could be devised for protection.

Meantime the Monitor, in command of Lieut. John L. Worden, had left New York and after a rough voyage, entered Hampton Roads at 9 o'clock the night after the battle. At 2 o'clock on the morning of the 9th she had anchored alongside the Minnesota. At 6 o'clock the Merrimac appeared bearing down on them, but at first passed by, gained the channel in which the Minnesota lay, and then steamed directly toward her. The Monitor swept in between the two and steered for the Merrimac. At close quarters the latter brought her bow-guns to bear and missed. There was little to fire at except the low turret with a cross-section of 20 feet. The first reply of the Monitor was a solid 11-inch shot which shook the Merrimac from stem to stern. The answer was a broadside, some of the shot of which struck the turret, either glancing or falling as harmless as the shot of the frigates the day before had proved against the Merrimac. Then followed broadside after broadside without producing the slightest effect on this "cheese-box on a raft," as spectators described it. At every opportunity of maneuver the Monitor closed in and smote with her 11-inch solid shot, bending the heavy armor and straining the timbers of her adversary. Finally the Merrimac left the Monitor and crowded steam for the Minnesota. Upon reaching point-blank range she received a full broadside, and a shot from a 10-inch pivot-gun, without suffering the slightest damage. In reply she raked the Minnesota with a shell, set her afire, blew up a tug alongside, and but for the Monitor, which had followed under full steam, and now swept in between the two, the Minnesota would have shared the fate of the Congress and Cumberland. In changing position to meet the Monitor the Merrimac grounded, and the Monitor continued her hammering with 11-inch shot. As soon as the Merrimac was floated she started rapidly down the bay, pursued by the Monitor. Suddenly she turned and attempted to run the Monitor down. The blow she struck with her prow glanced, and the Monitor was unharmed. The Merrimac then started for the Minnesota for the purpose of ramming her; but when within easy range the Merrimac, with all the Confederate ships, changed course at noon and headed for Norfolk. Her officers subsequently gave as a reason that in attempting to ram the Monitor her iron prow was broken, and their vessel was leaking. The armor was reported damaged, the stem twisted, the muzzles of two guns shot away, and the steam-pipe and smokestack riddled. The casualties were only two killed and 19 wounded. The consternation of the day before at Washington and the North was transferred to Richmond and the South. Preparations were hastily made by the Confederates for blocking the channels in the Elizabeth and Nansemond rivers, and to obstruct the channel of the James.

The Merrimac did not again engage the Monitor, and after the evacuation of Norfolk, which occurred 9 May, she was destroyed by the Confederates.

The Monitor had hurried direct from her shipyard to Fort Monroe and fought without a previous trial-trip, and before she had been accepted by the government. Her five hours' battle settled many questions, and once again in American history had been fired a "shot heard round the world."

H. V. Boynton.

Mon'itor Lizard, the type of a family of pleurodont lizards (*Varanidæ*), allied to the typical lizards (*Lacertidæ*). They are found in Africa, the Eastern Archipelago, etc., and are the largest of modern lizards, some species attaining a length of 6 or 8 feet. The skin shows little appearance of scales. The tail is long, cylindrical in the terrestrial, but compressed laterally in the aquatic forms, and possesses a sharp under ridge or keel. The limbs are well developed, and the toes provided with claws. Most of these great greenish-gray lizards inhabit rivers and ponds, and are active and fierce enemies of all lesser aquatic life. They feed upon the eggs and young of crocodiles, turtles and aquatic birds; and on fishes, amphibians, swimming-birds, anything, in fact, small enough to be mastered. The most familiar species, probably, is that of the Nile and other African rivers

(*Varanus niloticus*), upon which the English name «monitor» was first fastened by a ridiculous misinterpretation of the Arabic word *ouaran* (lizard); it is aquatic and frequently exceeding five feet in length. An equally well known kind is the East Indian monitor (*V. salvator*), which is to be met with from Ceylon and Western India to the Philippines, and is equally at home in the water, on land or in trees. Its rapacity is great and varied; and it is connected with many extraordinary rites and superstitions among the natives, some of which are given in Fennent's 'Sketches of the Natural History of Ceylon' (1861). Australia has a large species (*V. gouldi*).

Monito'rial System, or **Mutual Instruction,** in education, a plan to employ the more advanced boys in school to instruct the younger pupils. The method first occurred to Dr. Andrew Bell, when superintendent of the Orphan Hospital, Madras, in 1795, and was eagerly adopted by Joseph Lancaster, who in the first years of the 19th century did so much for the extension of popular education; and, from him and the originator, the system was called indifferently the Madras and the Lancastrian as well as the Monitorial or Mutual System. The monitorial system is not, as is commonly supposed, a method of teaching; it is simply a method of organizing schools, and of providing the necessary teaching power. See Education.

Monk, mŭnk, or **Monck, George,** Duke of Albemarle, English general: b. Potheridge, Devon, 6 Dec. 1608; d. Newhall, Essex, 3 Jan. 1670. At 17 he enlisted and served in the Cadiz expedition under Sir Richard Grenville, a relative; then entered the Dutch army; and returned to England in 1639, fought brilliantly in Scotland and after 1640 in Ireland, and on the outbreak of the civil war kept his commission in the king's army. But in 1644 he was captured by the Parliamentarian forces, and after two years' imprisonment in the Tower, joined the victors, for whom he went to Ulster as governor. Accused of exceeding his powers by arranging a truce (which was almost an alliance) with Owen O'Neil, he was recalled to England in 1649 and reprimanded at the bar of the House of Commons. At the victory of Dunbar in 1650 he did good service; a year later he was made lieutenant-general of the ordnance and in Cromwell's absence was commander-in-chief of Scotland. In 1652 he was made a general of the fleet. He introduced the elements of land tactics into naval formation and administered two crushing defeats to the Dutch, van Tromp being killed in the latter battle. In 1654 he again was sent to Scotland on the Royalist rising as commander of the army, and acted there with much prudence and success. After Oliver's death and Richard Cromwell's resignation Monk set himself to effect the Stuart Restoration, quietly shifted the forces in England until all was so arranged that there was no chance of armed resistance, and then (1660) brought back Charles II.,— a bloodless revolution meeting with general favor. He was made Duke of Albemarle, received other high honors, maintained order and showed rare courage in London during the Plague, but with an empty treasury in 1667 could not keep the Dutch from burning the shipping in the Thames. Short, fat, fair, and wrinkled, Monk was not a winning personality, being cold, prudent past a virtue, and rather unprincipled; but he was a wonderfully able general, with technical skill rare in one so lacking in theoretical training. His life was written by his chaplain, Dr. Thomas Gumble (1671). Consult also the biographies by Guizot (1838 and 1850); and that by Cobett (1889) in the 'English Men of Action' series.

Monk, Maria, Canadian impostor: b. about 1817; d. 1850. She attained notoriety in 1835 when she came to New York, stated that she had just made her escape from the Hôtel Dieu Nunnery, Montreal, and told most shocking details of convent life. She wrote 'Awful Disclosures' and 'Further Disclosures' in 1836; aroused a strong anti-Catholic movement, the American or «Know-Nothing» party especially using her story for political purposes; but was exposed and proved an impostor by William L. Stone in his book 'Maria Monk and the Nunnery of the Hôtel Dieu' (1836).

Monk, a bird. See Friar-bird.

Monk. See Monasticism.

Monk-fish, Angel-fish, or **Fiddle-fish,** a broad, flattened fish (*Squatina angelus*), closely allied to the sharks, but more like a ray in appearance, 5 or 6 feet long, having enlarged, winglike pectoral fins. It is found near the coast in the warm seas of Europe and North America; it usually stays near the bottom, is from three to four feet long, slow in motion, dull, voracious and useless, except that some shagreen may be obtained from its skin.

Monk-seal, a seal of the genus *Monachus,* so called from a humorous suggestion in its colors to the habit of a monk, the species properly so called is that (*M. albiventer*) of the Mediterranean; but the West Indian seal (*M. tropicalis*) is very similar to it, and is of interest as being almost extinct.

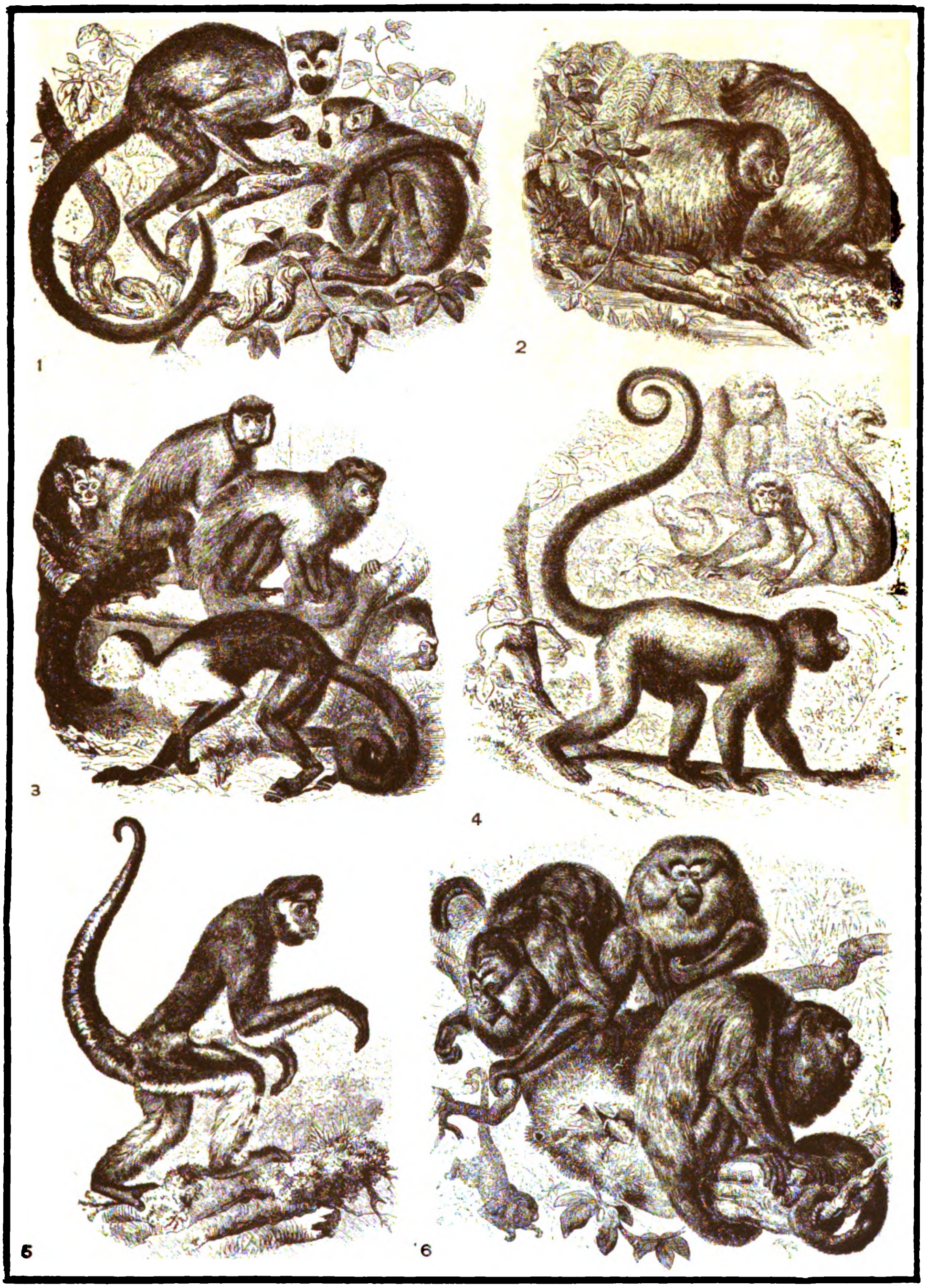
Monkey-bread, the fruit of the baobab-tree (q.v.).

Monkey-flower, any of many plants of the genus *Mimulus* (figwort family), so called because the face of the fox-glove-like corolla suggests that of a cheerful monkey. They are erect, tall herbs, with opposite, clasping, lanceolate dentate leaves, which bear in late summer solitary, axillary irregular blossoms of showy colors. The genus contains some 50 North American species, of which the most familiar is the square-stemmed of the eastern and central States (*M. ringens*). Its flower is violet. A common species on the Pacific coast (*M. guttatus*) has the corolla yellow, often blotched with red or purple.

Monkey Pot, the fruit of a forest tree of Brazil. See Brazil-Nut and Sapucaia Nut.

Monkeys, a general name for the animals of the highest mammalian order, the *Primates* (q.v.), excepting mankind and the lemurs; ordinarily also excepting the anthropoid apes (see Ape) and the baboons (q.v.). The term in fact, then, is suitably limited to three families, considered in their broadest sense, the *Hapalidæ, Cebidæ* and *Cercopithecidæ*. General characters are found in the short hallux, or great toe, being opposable to the other digits of the foot, so that the feet become converted functionally into hands. The pollex, or thumb, of the fore limbs may be absent, but when developed it is usually

AMERICAN MONKEYS.



1. Titi or Death's head Monkey (Chrysothrix sciureus)
2. Uakari Monkey (Uacaria calva).
3. A group of Capuchins or Sapajous (Cebus).
4. Barrigudo (Lagothrix humboldti).
5. Spider Monkey (Ateles bartletti).
6. Black Couxios (Pithecia satanus).

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opposable to the other fingers. These animals may thus be called "four-handed" or quadrumanous; hence the old designation *Quadrumana.* The limbs are nearly of equal length. There is only one pair of mammary glands, which are pectoral in position. In many cases the cheeks are dilated into pouches. The teeth consist of two incisors in each side of each jaw. The premolars or false molars, vary in number. The true molars number three in each side of each jaw, the latter teeth being furnished with tubercles of various sizes and shapes, adapted for crushing fruits and vegetables The canine teeth are generally strong and of large size. A *diastema* or interval exists between the lower canine and the first lower premolar tooth, and between the upper canine and outer incisor teeth: this interval admitting of the large canines being brought into apposition when the jaws are closed.

For information as to the probable descent and geological history of monkeys, see PRIMATES.

The small American monkeys of the family *Hapalidæ,* more usually called marmosets (q.v.), seem to be lowest in the scale of structure and nearest the lemurs, and are by some naturalists separated from the *Cebidæ* in a group *Arctopithecini.* They are least in size of the race, have the tail long, hairy and not prehensile; no cheek-pouches or natal callosities; the fore limbs shorter than the hind ones; the thumb not opposable; the ears hairy and of large size; the body covered by a close fur. Their dental formula gives four incisors, two canines, six premolars, and four molars in each jaw — this dentition resembling that of the Old World monkeys, and also that of man himself. The molars are provided with blunt processes. They are confined to tropical America, and wholly arboreal, feed on insects and fruit, and are tamable, gentle and intelligent. See MARMOSET.

Next to these come the *Cebidæ,* called New World monkeys, because the family is confined to the American continent, and also known as *Platyrhini,* because of the broad partition in the nose which widely separates the nostrils and causes them to open somewhat laterally. They are characterized by the possession of an extra premolar on each side of each jaw; and by the length and strong prehensility of the tail in most forms — an arrangement by which the end of the tail (naked there on its underside) curls without effort around a limb and clings firmly to it, giving so great assistance in climbing that many of these monkeys exhibit wonderful agility among the trees, grasping and swinging by their tails alone, leaving all four feet (or hands) free. By aid of this truly "handy" appendage some species will join into living chains, by means of which several will hang from a limb enabling the lowest one to grasp desired objects, otherwise unattainable; or will form bridges across spaces too long for the laden mothers or young to leap, and so the whole band will pass over a gap which they fear to cross by descending to the ground or swimming a stream. The ears are rounded and with most of the face, are destitute of hair, there are no cheek-pouches or callosities on the buttocks, so characteristic of the Old World forms. The hind limbs are generally the longer in this section. In the spider monkeys, however, the fore limbs are longer than the hinder members. The thumbs are not generally opposable, and may be wanting; and the thumb in these monkeys more nearly approaches the other fingers in size and form. Unlike other monkeys, they have the thumb placed in nearly the same plane as the other fingers, so that the mere position of the thumb renders it unfitted. The great toe is generally of large size, and is more capable of being opposed to the other digits than the thumb. The diet is mainly of a vegetable nature, and their life almost exclusively arboreal, a fact which, more than any question of climate, seems to limit them in range to the region of the tropics, between the plains of northern Mexico and those of southern Brazil, since several species dwell in the cold regions of high mountains. Of the *Cebidæ* the spider-monkeys (*Ateles*) present very typical examples. In these forms the tail reaches its greatest development as a prehensile organ. The limbs are exceedingly slender, and the thumb is rudimentary. (See SPIDER-MONKEY.) The capuchin monkeys, or Sapajous (q.v.) form the type of the genus *Cebus,* and include many species, as also does the genus *Callithrix* (see SQUIRREL-MONKEY). The howling monkeys (*Mycetes*) are so named from the loud howling noises they are capable of producing, through the possession of a bony "drum," which opens into the larynx, and which greatly increases the resonance of the voice. Other genera are *Pithecia,* the sakis, or hooded monkeys; *Uacavia,* the woolly monkeys; *Chrysothrix* or golden monkeys; and *Nictipithecus,* the golden monkeys which are elsewhere described.

The last and highest section of the monkeys (next to the anthropoid apes) is that of the Old World tribe *Cercopithecidæ,* if that family name is used, as is recently the custom, to cover all the formerly called "catarrhine" monkeys, distinguished by their obliquely-set nostrils, the nasal apertures being placed close together, and the nasal septum being narrow. Opposable thumbs and great toes exist in all, except the genus *Colobus,* the members of which want thumbs. The teeth are arranged to exhibit four incisors, two canines, four premolars, and six molars in each jaw; the incisors are prominent, and the canines are especially large and strong — the latter teeth being separated by an interval or diastema from the upper outer incisor, and from the first lower premolar. The tail may be rudimentary or wanting, but in no case is it prehensile. Cheek-pouches, or pocket-like cavities excavated in the cheeks, which are used as receptacles for food preparatory to its mastication, are present in many; and the skin covering the prominences of the buttocks is frequently destitute of hair, becomes hardened, and thus constitutes the so-called *natal callosities* of these animals. Sometimes these callosities exhibit brilliant colors, and the skin in the neighborhood of the nose, as in the mandrill, may also be striped with gay hues. In their distribution all the catarrhine monkeys inhabit Asia and Africa, a macaque inhabiting the Rock of Gibraltar, and called Barbary ape (q.v.).

Many of these monkeys are small or of moderate size, handsome and graceful. Such are the African guenons, green monkeys and mangabeys (qq.v.) of the genera *Cercopithecus* and *Cercocebus.* Nearly related to them are the macaques (q.v.); and the baboons (q.v.). These have cheek-pouches, and the fore limbs the longer. The genera without cheek-pouches and with the hind limbs longer than the fore limbs, are the African thumbless genus *Colobus*, which contains the guerezas (q.v.); and the East Indian tribe *Semnopitheous* which contains the Hindu sacred monkey or entellus (q.v.), the proboscis-monkey, negro monkey and several others described elsewhere under their names, some of which are large and extraordinary.

These Old World monkeys are more varied in their food and activities than are those of America, and are far superior to them in intelligence; consequently they furnish nearly all the pets, circus-performers and servants of wandering musicians that we see from time to time. Many of them breed in captivity, adapt themselves well to civilized life, and betray a surprising ability to learn in various directions, though prone to be inattentive, and growing dull and surly in old age. Few, however, when taken into cold climates live long, even when most carefully treated, as they seem peculiarly susceptible to diseases of the lungs, which usually have a fatal termination.

Excellent accounts of the monkeys of the world exist in the 'Standard,' 'Royal,' 'Cassell's,' and 'Allen's Natural Histories'; the last and most recent being a monograph by Forbes. Otherwise information must be gleaned mainly from the books of scientific travelers.

Monkhouse, William Cosmo, English author: b. England 1840; d. Skegness, Lincolnshire, England, 20 July 1901. He received his education at St. Paul's School in London and in 1857 became a junior clerk in the Board of Trade office with which he was connected with advancement for the remainder of his life. Although not a great poet his work enjoys a high reputation among the works of the minor poets and as an art critic he won considerable attention. His work for the 'Dictionary of National Biography' takes within its scope practically all of British art. He published: 'A Question of Honor,' novel (1868); 'The Works of John Henry Foley' (1875); 'The Italian Pre-Raphaelites' (1887); 'British Contemporary Artists' (1899); etc. Among his poetical works are: 'A Dream of Idleness' (1865); 'The Christ upon the Hill' (1895); etc.

Monks'hood. See ACONITE.

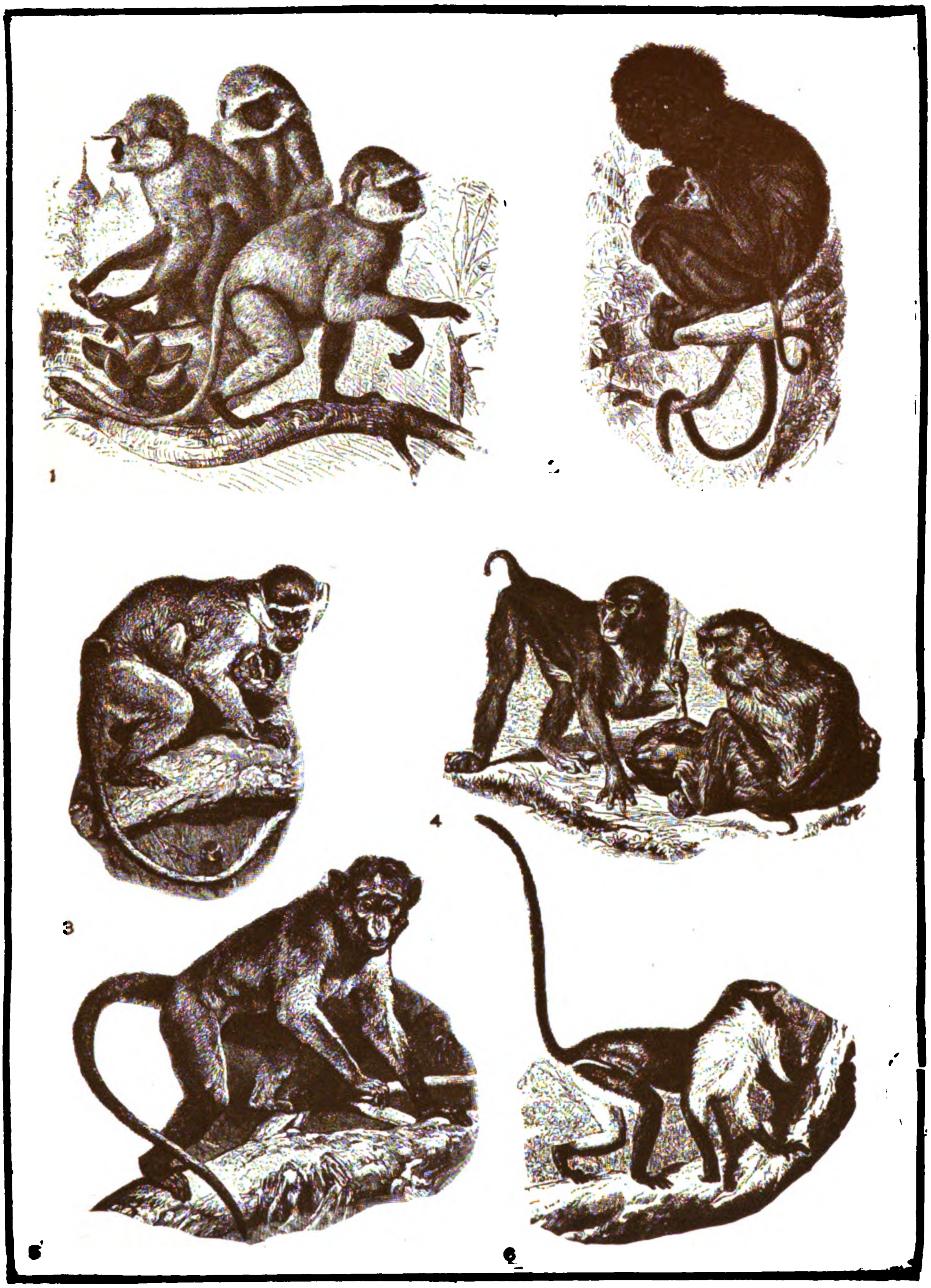
Monmouth, mŏn'mŭth, **James,** DUKE OF, claimant to the English throne: b. Rotterdam 9 April 1649; d. London 25 July 1685. He was the natural son of Charles II. and of Lucy Walters, as seems certain from the king's open recognition of him, although he so closely resembled Robert Sidney, whose mistress his mother had been, that Sidney has been supposed his father. He was brought up in France under the care of Henrietta Maria, the queen-dowager; was recognized and summoned to England by his father after the Restoration; was married to Anne Scott, heiress of Buccleuch and made Duke of Monmouth; and served in Holland in 1673. His Protestant sympathies, his clemency to the Scottish Covenanters whom he defeated at Bothwell Bridge (1679), and a story persistently circulated (and denied before Privy Council by the king) that Charles had secretly married his mother in Holland, made him popular with the Protestant party; and Shaftesbury repeatedly urged the king to legitimatize him and ensure a peaceable Protestant succession. He did his best to exclude James from the throne. After the Rye House Plot he escaped to Holland. Thence after the accession of James II. he invaded England, possibly with the complicity of William of Orange, called the people to arms, raised a large force of Protestants, was proclaimed king at Taunton, but was defeated by Faversham at Sedgemoor. Taken prisoner he begged for his life from the king to no purpose, and was executed at the age of 36. He was handsome, weak, fickle, and in his claims to the throne no doubt entirely under the control of political plotters. The 'Diaries' of Evelyn and Pepys give the setting of Monmouth's career; his rising is sketched with some historical verisimilitude in Doyle's 'Micah Clarke' (1888), a romance. Consult also Roberts, 'Life of Monmouth' (1844) and Fea, 'King Monmouth' (1901); the latter work outlines the popular legend that Monmouth was not executed, a substitute having taken his place, and tells how the country people long expected his return.

Monmouth, Ill., city, county-seat of Warren County; on the Chicago, Burlington & Quincy and the Iowa Central R.R.'s; about 95 miles north by west of Springfield. It is in an agricultural region, and nearby are coal fields and valuable clay deposits. It was settled in 1836, and in 1852 was incorporated. The present charter (1904) was granted in 1874.

The chief manufactures are pottery, sewer pipe, stoneware, boxes, agricultural implements, stump-pullers, soap, flour and dairy products. The trade is principally in coal, grain, flour, poultry, dairy products, and live-stock. Monmouth College, founded in 1856 under the auspices of the United Presbyterian Church, is here, also the Warren County Library. The chief city officers are the mayor, who holds office two years, and the council. The waterworks are owned and operated by the municipality. Pop. (1890) 5,936; (1900) 7,450; (1910) 9,128.

Monmouth, Battle of, in American history, a celebrated engagement between the American and British forces, the former commanded by Gen. Washington and the latter by Sir Henry Clinton, which took place at Freehold, Monmouth County, N. J., 28 June 1778. On 18 June Sir Henry Clinton, acting under peremptory orders from the British ministry, evacuated Philadelphia, which had been occupied by his army since the preceding September, and proceeded across New Jersey toward Brunswick, with a view of embarking on the Raritan. On hearing of this movement, Washington broke up his camp at Valley Forge, and, having sent forward some light troops to harass the enemy, started in pursuit. Owing to excessive heat the march of both armies was slow. At Allentown Clinton turned to the right by a road leading through Freehold to Sandy Hook, to embark at the latter place; and Washington, who had hitherto been deterred by the advice of his officers, and particularly of Gen. Charles Lee, from attacking the enemy, determined at once to give him battle. The evening of the 27th found the main body of the enemy encampd on high ground near Monmouth court house, while the American advance, about 4,000 strong, under Lee, was posted at Englishtown, 5 miles distant, with the main body about 3 miles in the rear.

OLD WORLD MONKEYS.



1. Hanuman Monkey (Semnopithecus entellus).
2. Negro Monkey (Semnopithecus maurus).
3. Green Monkey (Cercopithecus callitrichus).
4. Pig-tailed Monkey (Macacus leoninus).
5. Bonnet Macaque (Macacus cynomolgus).
6. Diana Monkey (Cercopithecus diana).

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The command of the advance had originally been given to Lafayette, with the consent of Lee; but the latter subsequently applied for and obtained it. Early on the 28th Lee engaged the rear division of the enemy, his orders being to hold it in check until the main body under Washington could come up. The Americans were at first successful, but owing to causes which have never been satisfactorily explained, the whole body soon after fell into a confusion (possibly because of Lee's attempted treason), and commenced a disorderly retreat, closely followed by the British. Washington, who was advancing hastily with the main body, received the first intimation of this movement in the crowds of fugitives who poured along the road. Exasperated at the failure of Lee to execute his orders he rode up to that general and reprimanded him. Then he re-formed them, and hastened back to bring up the main body. Lee, resuming his command, held his position with spirit until compelled to retire and brought off his troops in good order. The main body, which had meanwhile taken a favorable position on an eminence, with a morass in front and a wood in the rear, opened an effective cannonade upon the British. The latter, after an ineffectual attempt to turn the American left under Lord Stirling, directed their chief efforts against the right commanded by Greene, where Wayne, under cover of an orchard, was harassing their centre by a severe fire. To dislodge him Col. Moncton advanced with a column of royal grenadiers, but fell at the head of his troops, who were repulsed with considerable loss. The enemy at length fell back to the ground occupied by Lee in the morning, whither Washington was preparing to follow them when the approach of night and the exhaustion of his men induced him to defer the execution of his plan until the morning. During the night Clinton effected a noiseless retreat, and at daybreak was many miles away from the scene of battle. The excessive heat of the weather and the fatigued condition of the troops rendered a pursuit impracticable, and the royal army was suffered to proceed unmolested to the place of embarkation. The American loss in this engagement was 69 killed and 160 wounded; the British 300 killed and 100 prisoners including wounded. Their total loss by desertions and the casualties of battle during their march through New Jersey has been estimated at 2,000. For his conduct in this battle Lee was court-martialed and suspended for one year from his command.

Monmouth College, in Monmouth, Ill., a coeducational institution, under the auspices of the United Presbyterians. It was founded in 1856, and in 1910 there were connected with the school 28 professors and instructors and 435 students. There were about 8,000 volumes in the library; the grounds and buildings were valued at $125,000; the productive funds amounted to $275,000; and the annual income was about $43,000. The departments are the preparatory, music and art, and graduates. The college courses consist of nine groups which lead to the degrees of B.A. and B.L.

Mono, mō'nō, a lake or «sink» in Mono County, Cal., on the eastern slope of the Sierra Nevada, about 150 miles southeast of Sacramento. The lake is circular in form, nearly 15 miles across; area, about 200 square miles. A short railroad passes along the eastern shore. A number of streams enter the lake, but it has no apparent outlet. The waters are alkaline and contain no fish. A species of insect deposit their ova on the surface of the waters, and sometimes so great are the numbers that they look like islands. The Digger Indians collect the insects and ova, and prepare from them an edible delicacy. See KOOCHAH-BEE.

Mono, the common name in Guatemala for the Central American howling monkey (*Mycetes villosus*).

Monocacy, mō-nŏk'a-sĭ, **Battle on the.** In 1864 (4 and 5 July) Gen. Early, after driving the Union forces, under Gen. Sigel, from the lower Shenandoah Valley, crossed the Potomac into Maryland north of Harper's Ferry, on his march to Washington, demonstrated on Sigel, who had retreated to Maryland Heights and, crossing South Mountain by Turner's and Crampton's Gaps, concentrated his main body on the night of the 8th near Middletown in the Catoctin Valley, his cavalry, after some sharp skirmishing during the day, being in advance, between Middletown and Frederick. Meanwhile Union forces had gathered to oppose his march. Gen. Lew Wallace, commanding the Middle Department, with headquarters at Baltimore, on the 6th collected a mixed force, numbering 2,700 men, under Gen. E. B. Tyler, at Monocacy Junction, near Frederick, and disposed it to cover the Baltimore & Ohio railroad and its bridge, and the Baltimore pike with its stone-pier bridge. Cavalry was sent out on the road beyond Frederick, which ran into Bradley T. Johnson's cavalry, and fell back. On the 8th Wallace was joined by a part of Ricketts' division of the Sixth corps from the Army of the Potomac, which was advanced to Frederick, but during the night it was withdrawn and crossed to the east bank of the Monocacy, where meanwhile other parts of Ricketts' division had come up by rail from Baltimore. Ricketts' division of about 3,350 men was formed on Tyler's left, covering the Washington road and its wooden bridge. Both flanks and the fords were guarded by cavalry, and skirmishers were deployed on the bank of the river. Wallace had but six field-guns; three were given to Tyler and three to Ricketts. An earthwork and two blockhouses commanded both the railroad bridge and the bridge on the Washington road. On the morning of the 9th Early advanced from Frederick to attack Wallace, Rodes' division on the left, along the Baltimore Pike, and Ramseur's in the centre on the Washington road, while Gordon's division, following McCausland's cavalry, inclined to the right to reach the fords a mile below Wallace's left. Rodes and Ramseur drove the Union skirmishers to the banks of the river; Ramseur drove those in his front beyond it; and four heavy batteries of 16 guns crowning the heights near the river, at 9 A.M. opened fire upon the Union lines opposite. By noon the Confederate cavalry had forded the river, and dismounting, advanced on Ricketts' left, gaining a temporary advantage, but were soon driven back. Gordon then crossed his infantry and reinforced the cavalry. Ricketts, holding on to the bridge with his right to check Ramseur, changed front to the left and engaged Gordon and the cavalry, sometimes yielding ground, and again regaining it, but the enfilading fire of the guns across the river, and the continued heavy pressure of Gordon on his front, right, and left flanks, caused Wallace at 4 P.M. to withdraw him toward the Baltimore Pike, having first burned the wooden bridge and the blockhouse at its farther end. Tyler had continued to hold his position against Rodes, in part west of the river, covering the stone bridge of the Baltimore Pike, but Gordon's troops, following up the east side of the stream, on Ricketts' heels, struck the pike before the bridge-guard could get away, capturing several hundred prisoners, Tyler narrowly escaping. Wallace fell back by the Baltimore road in the direction of Ellicott's Mills, Early following but a short distance. Early buried his dead and sent over 400 of his severely wounded to the hospitals in Frederick. He levied and collected $200,000 from the citizens of Frederick, seized a good supply of shoes, bacon, and flour, and on the morning of the 10th resumed his march on the direct road to Washington, halting at night within four miles of Rockville. The Union loss at Monocacy was 123 killed, 603 wounded, and 568 missing, a total of 1,294, of whom 1,073 were of Ricketts' division. Early reports his loss as about 700 killed and wounded, but it must have been greater, as Gordon reports the loss in his division alone as 698. The great importance of the battle on the Monocacy lies in the fact that the day gained in delaying Early enabled the remainder of the Sixth corps to reach Washington from Grant's army, as well as a part of the Nineteenth corps from New Orleans, before Early could make an attack on the city. Gen. Grant says: «Whether the delay caused by the battle amounted to a day or not, Gen. Wallace contributed on this occasion, by the defeat of the troops under him, a greater benefit to the cause than often falls to the lot of a commander of an equal force to render by means of a victory.» Consult: ‹Official Records,› Vol. XXXVII.; Pond, ‹The Shenandoah Valley in 1864›; Grant, ‹Personal Memoirs,› Vol. II.; Early, ‹Last Year of the War for Independence›; The Century Company's ‹Battles and Leaders of the Civil War,› Vol. IV.

E. A. Carman.

Mon'ochord, a musical instrument with one string, invented by Pythagoras, and much employed by the ancients in the musical training of the voice and ear. The modified form of the instrument used in natural philosophy lecture-rooms is often called a sonometer; it consists of one or more strings stretched over a sounding-box. A string is fastened at one end of the box, and passes at the other end over a fixed pulley, which enables it to be stretched by means of weights; it passes over two fixed bridges near the ends of the box, and there is a movable bridge between to alter the length of the vibrating portion of the string. Strings are employed to produce musical sounds in the violin, harp, guitar, piano, etc. The sonometer is an indispensable piece of apparatus to lecturers on acoustics not only for the proof of the law of vibrating strings, but also to illustrate the relations of harmonics and the fundamental ideas of undulations. See Vibration; Pianoforte.

Monochromatic Light, in physics, a light which consists of a single color which is so pure and so definite that when it is examined by the spectroscope it gives but a single bright line. An approximately monochromatic light may easily be obtained by volatilizing salt, or some other sodium compound, in the flame of a Bunsen burner. An orange-yellow color, of great purity, results. Viewed by this light, everything white or yellow looks bright, while vermilion, ultramarine and other colors that do not contain any sensible proportion of yellow, appear black. Monochromatic light is greatly used in physics, for the study of certain kinds of phenomena in optics.

Mon'ochrome (Greek, *monos*, single, and *chroma*, color), in ancient art, a painting executed in a single color. The first specimens of the art of painting were of one tint only, which was most commonly red, made either with cinnabar or minium. Instead of red, white paint was sometimes used. The first four plates in the first volume of the paintings of Herculaneum contain several monochromes upon marble. The most numerous monuments existing of this kind of painting are on terra cotta. A painting, to be a proper monochrome, must be relieved by light and shade.

Monoclin'ic System. See Crystal.

Monocotyle'dons, plants of that grand division of angiospermous plants whose embryos sprout in only one seed-leaf or cotyledon, which springs from one side of the axis of growth; the opposite of Dicotyledons (q.v.). In one system of botany the term was employed as a synonym of *Endogens*, but this use is obsolete.

Monodel'phia, the name formerly applied to all mammals esteemed higher than marsupials (*Didelphia*) considered as a group distinguished primarily by the fact that the uterus or womb is single, and shows a single uterine cavity. It has been shown, however, that this distinction does not hold, and the term has consequently become obsolete.

Monœ'cius Inflorescence. See Diœcious Flower.

Mon'ogram (*monos*, single or only, and *gramma*, meaning «a single mark»), a character or cipher composed of one, two, or more letters interwoven, being a sort of abbreviation of a name, used as a seal or badge, in coats of arms, etc. Monograms were much used on coins, by the Romans, for instance, though they did not employ them on inscriptions; and were also used on standards, walls and tapestry, seals and documents; first on coins, latest on documents, in which they were employed not only by princes and ecclesiastical dignitaries, but also by magistrates and notaries. At the commencement of the Christian period their use was universal. The titles and rubrics of Greek manuscripts are frequently monogrammatic, and numerous and diversified monograms are found in Latin manuscripts. Alphabets like the Roman, of an angular character, have many letters with corresponding parts; and the upright strokes, the horizontal lines, and the curves are easily made by arranging them so that the similar portions shall coincide, to produce numerous combinations. Monograms are generally combinations of more than two letters; when only two were incorporated they were generally designated ligatures. After the 12th century they gradually went out of use. The use of them remained longest in Germany, where it was formally abolished by the Diet of Worms, in 1495. The knowledge of monograms of this public kind is of great importance for the illustration of the monuments and documents of the Middle Ages, and therefore forms a particular branch of diplomatics; for they were much employed in the mediæval diplomatic art. The term was subsequently applied to all sorts of ciphers and signs, with which artists, particularly painters and engravers, were accustomed to designate their works. The mediæval seal-engraver, to economize as much as possible the annular space available for the legend, favored much both ligatures and monograms. Many of those seals had the initials of their owners blended and incorporated with the devices, called merchant-marks, corresponding somewhat to the modern trade-marks, which were the stamp, as it were, by which the work of each artist was known. Many of the modern monograms are copied from mediæval examples. Consult: Brulliot, 'Dict. des Monogrammes' (1832–34); Duplessis and Bouchot, 'Dict. des Marques et Monogrammes de Graveurs' (1886–7); Bouvenne, 'Les Monogrammes Historiques' (1870); Fagan, 'Collectors' Marks' (1883).

Monoliths. See STANDING STONES.

Monomet'allism, the principle of having only one metallic standard in the coinage of a country, opposed to bimetallism. See BIMETALLISM; COINAGE; CURRENCY.

Monona, mō-nō'nạ, a lake in Wisconsin, one of a group of lakes near Madison in Dane County. See FOUR LAKES.

Monongahela, mō-nŏn-gạ-hē'lạ, a river which has its rise in the northwestern part of West Virginia, and flows north into Pennsylvania, where it unites, at Pittsburg, with the Allegheny and forms the Ohio River. The headwaters of the Monongahela are in the Alleghany Mountains near the headwaters of the Potomac. The two head-streams of the Monongahela unite near Fairmont in Marion County, W. Va., and from the point of junction on the north become a swiftly flowing stream, furnishing water-power for several manufacturing towns and cities. The whole course is very irregular; the length is about 300 miles. It has been made navigable about 106 miles from its mouth to Morgantown, in Monongalia County, W. Va., by a system of locks, nine in number. Other locks above Morgantown are being constructed and government plans to make the river navigable as far as Fairmont are being put into execution (1903). The largest tributary is the Youghiogheny, a navigable river, which has its source in the mountains in the southwestern part of Garrett County, Md., and enters the Monongahela near Pittsburg. The Cheat River, the next largest tributary, is a stream in the northeastern part of West Virginia. It joins the Monongahela in Pennsylvania, a few miles north of the border. The river flows through a country which has fertile farm lands in the valley, and the whole section is rich in coal.

Monongahela City, city in Washington County, Pa.; on the Monongahela River, and on the Pennsylvania and the Pittsburg & L. E. R.R.'s; about 32 miles south of Pittsburg. It is in a coal region, in which the chief industries are coal mining and manufacturing. It was settled in 1792 by Joseph Parkison, was incorporated as a borough 3 April 1833, and chartered as a city 24 March 1873. It has (1903) 15 large industrial establishments, employing about 5,800 persons, or about 600 more than the whole population as given by the Federal census of 1900. The chief manufactures are glass, foundry and machine-shop products, flour, lumber, and paper. It has considerable trade in the home manufactures, and in coal and farm products. The principal buildings are 11 churches, five public schools, an academy, and a Memorial Hospital. The four banks contain a combined capital of $2,500,000. The government is administered under the original charter, and provides for a mayor and a council of 12 members, all of whom are elected annually. The majority of the inhabitants are American born, but there are quite a number of Italians and Slavs. Pop. (1890) 4,096; (1900) 5,173. In 1910 the population was 7,598.

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Monoph'ysites, those followers of the heretical opinion in the early Church, which ascribed but one nature to Christ in contradistinction to the orthodox doctrine that he was true God and true man. The Monophysites were mainly confined to the Eastern Church, and obtained no footing in the West. The edict called Henoticon, issued by the Emperor Zeno in 482, was not able to quiet the long and often bloody contests incident to this controversy, and the orthodox church, by its sentences of excommunication, occasioned a formal secession on the part of the Monophysites. This separation took place in the first half of the 6th century. Nor did they remain united among themselves. In 519 controversies arose among them respecting the question whether the body of Christ is corruptible or not. About 560 a Monophysite, Askusnages, and after him Philoponus, a noted Alexandrian philosopher of that century, conceived the idea of styling the three persons of the Deity three Gods. These Tritheists and their adherents, even in the eyes of the Monophysites, were the rankest heretics, and were the occasion of many Monophysites turning Catholics. In Egypt, Syria, and Mesopotamia the Monophysite congregations, however, remained the strongest, had patriarchs at Alexandria and Antioch, existing, without interruption, by the side of the imperial orthodox patriarchs; and after the Syrian, Jacob Baradæus, had, about 570, established their religious constitution, formed the independent churches of the Jacobites and Armenians, which separated from the Greeks as well as the Romans, and have for that reason been able to maintain themselves since the 7th century, even under the dominion of the Mohammedans. Excepting their peculiar doctrine of one nature in Christ, they coincide, in the main points of belief, with the Greek Church; their worship also resembles the Greek rather than the Roman, but has, from their national character and their superstition, received variations, which are most striking in the religious constitution of the Egyptian Jacobites (q.v.). See JACOBITES and *Armenian Church* under ARMENIA.

Monopleg'ia, mŏn-ŏ-plĕ'jĭ-a (from Greek μόνος, single + πληγή, a stroke), a paralysis limited to one organ or part. It is caused by, circumscribed lesions of the nervous system, in brain, spinal cord, or nerves. An example of such paralysis is monoplegia facialis, Bell's palsy (q.v.).

Monop'oly (Greek, *monopolia,* single or sole selling) is an exclusive right, secured to one or more persons, to carry on some branch of trade or manufacture, in contradistinction to a freedom of trade or manufacture enjoyed by all the world. The most frequent monopolies formerly granted were the right of trading to certain foreign countries, the right of importing or exporting certain articles, and that of exercising particular arts or trades. Such exclusive rights were very common in Great Britain previous to the accession of the house of Stuart, and were carried to an oppressive and injurious extent during the reign of Queen Elizabeth. The grievance at length became so insupportable that, notwithstanding the opposition of government, which looked upon the power of granting monopolies as a very valuable part of the prerogative, they were abolished by an act of 1624. This act secured the freedom of industry in Great Britain; and has done more, perhaps, to excite a spirit of invention and industry, and to accelerate the progress of wealth, than any other in the statute-book. There is one species of monopoly sanctioned by the laws of all countries that have made any advances in the arts, namely, the exclusive right of an invention or improvement for a limited number of years. It is, in fact, a kind of property created by law for the benefit of the inventor, and which he could not effectually acquire or secure without the aid of the law. The exclusive right of an author to the publication of his own work is hardly a monopoly, but rather a right of property, resting upon the same principle as the right to lands or chattels. The law, therefore, by giving an author the exclusive right to the publication of his own work for a limited number of years makes no grant; it is only allowing him what is his own for a limited time. But the exclusive right to the use of an invention or improvement is a monopoly, since it deprives others, for that period, of the chance of the advantage of making the same improvement, discovery, or invention themselves. Capitalists, either single or combined, may produce commodities so much better and cheaper than others can do as practically to command the entire sale, and are in popular language called monopolists. But having no legal rights or advantages that are not open to all, they are not in the legal sense in possession of a monopoly. In the oldest sense of the term they are monopolists; but since the term is now used in an unfavorable sense, its discontinuance as applicable to these is only just. It may be assumed as an economical axiom that every interference with absolute freedom in acts of exchange can be defended only on the highest grounds of public policy. Any advantage given to a particular interest is not only a wrong to the general public, but will in time bring a just retribution to the favored class.

In the United States the only monopolies that the laws and the individual States look on with favor consist of the post-office, which is a government monopoly, and the rights granted to individuals under the patent and copyright laws. Monopolies commonly known as trusts are looked on with odium, and various States have enacted laws making a trust an illegal combination of individuals. See TRUSTS.

Mon'otheism (Greek *μόνος,* only one; *θεός,* god), the belief in the existence of one only, as opposed to a belief in many gods, polytheism. Even in polytheisms there is generally some chief and predominant deity, and many investigators believe that the belief in a divine power and person may be traced through three stages of development. The vague impression which savage man receives from witnessing the operations of nature changes into a conviction that there is some superior and invisible power overruling all things; to the agency of this power he attributes the suffering, disease and death which he meets with in the experience of life. This unanalyzed power is dimly conceived of by him as one and all pervading, and primitive deism of this kind has received the name of Henotheism (from the Greek *εἱς, ἑνός,* one). It is only when fancy and imagination begin to operate, and the clouds of superstition to darken, that this unified power is differentiated, and each manifestation of it, in the sea, the sky, the soil, is attributed to a specific agent. The complicated mythologies of Greece and Rome are high developments of original henotheism, rather than proofs of degeneracy. In the earliest stage of human development science and theology are one, and must advance together; they can only advance by analysis, which reveals the differentiation of species, and concomitant complexities. Hence the discovery of a new god every time the mind has been concentrated upon a single and distinct operation or phenomenon of nature, whether it be the rainbow, the storm at sea, or a volcanic eruption. When science and theology are once divorced, the result must be either monotheism or atheism.

The history of monotheism may be thus summarized: According to Professor Max Müller the conviction of the existence of one God was not an intuition, but the result of a gradual education. It is held by some that the third chapter of Genesis embodies the doctrine of the unity of the Godhead, and of a co-equal and co-eternal Trinity. In the earlier Vedic writings, which exhibit the most primitive workings of the human mind of which we have any record, we find that a consciousness of their own existence led men to endow every created object with life. The natural issue of such a condition of thought was either polytheism or fetishism, that is, either a plurality of deities with human forms and passions, or an abject terror of inanimate objects. But anthropomorphous polytheism did not determine the convictions of the highest thinkers under the system, such as Buddha, Confucius, Socrates, Plato, etc. The writings of Confucius, Buddha, Plato and even Hesiod and Sophocles prove that the religious convictions of a people are not to be measured or tested by the gross details and elaborate observances of a mythological system. The Jewish prophets had a firm persuasion of one God, the Father and Judge of all; but they are continually upbraiding the people for lapsing into polytheism. After the Babylonish captivity the people became fixed in their belief; and now the Jews and Mohammedans hold the doctrine of the divine unity with as great rigor and tenacity as modern Christians. They will not countenance even the Trinitarian conception of Deity, although this is as purely monotheistic as their own anthropomorphic notions of the Supreme Being. The monotheism of the Hebrews came to Europe as a systematized doctrine, just when Greek philosophy had succeeded in sweeping away the last vestige of polytheism among the civilized peoples of the Mediterranean basin. It came with the added enthusiasm of Christianity and conquered the world. See GOD, TRINITY.

Consult: Renan, 'Histoire générale et Système comparé des Langues Semitiques' (1858); Max Müller, 'Chips from a German Workshop'; Gould, 'Origin of Religious Belief'; Hagenback, 'History of Doctrines'; and Siddon, 'Divinity of Christ.'

Monoth'elites (Greek, *monothelētai,* from *monos*, and *thelō,* I will), a sect of heretics who maintained that though Christ had two natures co-existing distinctly in the unity of the person, yet these natures possessed or acted by but a single will — the divine, which so predominated over or absorbed the human as to deprive it of all action or efficiency. They have been regarded as an offshoot of the Monophysites, though they themselves denied all connection with them. The doctrine originated with the Emperor Heraclius, who in 630, by adopting a middle course, attempted to reconcile the Monophysites to the orthodox church. The attempt was for a time successful. Heraclius consulted Sergius I., patriarch of Constantinople, on the new dogma, and he not only approved of it, but became its most active propagandist. At his instance, and mainly in consequence of his representations, Pope Honorius I. addressed two letters to Sergius, which according to some interpreters would seem to favor Monothelism. The successors of Honorius condemned the Monothelites, and Martin I., in 649, issued a bull anathematizing them. For this he was sent prisoner to the Chersonesus by the Emperor Constans, who protected the Monothelites. The sixth ecumenical council, that of Constantinople (680), condemned this heresy, and with this the early controversies on the incarnation became gradually fainter, till they were forgotten amid the disputes between the Iconoclasts and their opponents.

Monotrem'ata, an order of mammals belonging to the subclass *Protothesia* (q.v.) and represented by the duckbill (q.v.) of Australia and Tasmania, and the spiny ant-eaters (see ECHIDNA), the range of which extends into New Guinea. In many respects they recall the *Sauropsida* and especially the birds, a fact reflected in the name *Ornithodelphia* sometimes applied to them. The most marked of these peculiarities are the obliteration of the sutures of the skull, the possession of a terminal canal (cloaca) into which both the digestive tract and the urogenital organs empty; the possession of a well developed coracoid bone; and the fact that they do not, like other mammals, bring forth living young, but lay eggs. After the eggs are laid they are transferred to a temporary pouch beneath the abdomen, where they hatch and the young are nourished by the mammary glands.

Mon'otype. See COMPOSING MACHINES.

Monoxid, in chemistry, a compound consisting of one atom of oxygen united to one atom of another divalent substance, or of one atom of oxygen united to two atoms of some other monovalent substance. The word is used when it is necessary to distinguish two or more states of oxidation of the same substance. Thus CO is called "carbon monoxid," in distinction to CO_2, which is called "carbon dioxid." Similarly Na_2O is "sodium monoxid," while Na_2O_2 is "sodium dioxid." See OXIDE.

Monro, mŭn-rō', **Alexander,** Scottish anatomist: b. London 8 Sept. 1697; d. Edinburgh, 10 July 1767. He studied at Edinburgh, afterward in London under Cheselden, and still further both in Paris and Leyden, at the former under Bouquet, and at the latter under Boerhaave. On his return to Edinburgh in 1719 he was made professor of anatomy and surgery to the surgeon's company; in 1720, the first university professor of anatomy, though not inducted till 1725. He attended the wounded on the field at Prestonpans (21 Sept. 1745), and was an accurate observer, having studied the effect of the presence of solid bodies in the vermiform appendix, and otherwise anticipated later views. He resigned his professorship in 1764. His principal work is 'Osteology, a Treatise on the Anatomy of the Human Bones' (1726), once a popular text-book.

Monro, Alexander, known as Secundus; Scottish anatomist: b. Edinburgh 20 May 1733; d. there 2 Oct. 1817. He was son of Alexander Monro (1697–1767) (q.v.). Educated at Edinburgh University (M.D. 1755), he also studied on the Continent, and in 1759–1808 lectured at Edinburgh. In 1783 he described the communication between the lateral ventricles of the brain, known as the foramen of Monro. He published 'Three Treatises on the Brain, the Eye, and the Ear' (1797) and other medical works.

Monro, Alexander, known as Tertius, Scottish anatomist: b. Edinburgh 5 Nov. 1773; d. Craiglockhart, near Edinburgh, 10 March 1859. He was the son of Alexander Monro (1733–1817) (q.v.). He obtained his M.D. at Edinburgh in 1797, was appointed conjoint professor with Monro Secundus of medicine, surgery and anatomy, and in 1817–46 was sole professor. His works include 'Observations on Crural Hernia' (1803), and other publications, of no permanent value.

Monroe, Harriet, American author: b. Chicago, Ill.; 23 Dec. 1860. She was graduated from the Visitation Academy, Georgetown, D. C., in 1879 and has since devoted herself to literature. In 1889 she wrote the text of the cantata given at the opening of the Chicago Auditorium and in 1891 wrote by request of the committee the 'Columbian Ode' which was sung at the dedicatory ceremonies at the World's Columbian Exposition in 1892. She has published: 'Valeria and Other Poems' (1892); 'John Wilborn Root — a Memoir' (1896); etc.

Monroe, James, fifth President of the United States: b. in Westmoreland County, Va., 28 April 1758; d. New York 4 July 1831. He was descended from a Scottish cavalier family, studied for a short time at the College of William and Mary, which he left on the outbreak of the Revolutionary War to enlist in the Continental army, and in 1776 became lieutenant in a Virginia regiment. He served in the campaign on the Hudson, taking part in the battles of Harlem Heights and White Plains. Accompanying Washington in his retreat through New Jersey, he distinguished himself at the battle of Trenton, where he was wounded. As major on the staff of Lord Stirling (William Alexander) he served in the campaigns of 1777-8, winning credit in the battles of Brandywine, Germantown, and Monmouth. Having lost his rank in the line by becoming a staff-officer, and failing in an attempt to raise a regiment which was authorized by the legislature of Virginia, he withdrew from the military service, made the acquaintance of Jefferson, and with him studied law, the two forming a life-long intimacy. During the subsequent invasions of Virginia he took an active part in organizing the militia for defense. In 1782 he was elected to the Virginia legislature, and was also appointed a member of the Executive Council. In the Congress of the Confederation, where he served from 1783 to 1786, he advocated extension of the powers of that body, and the favorable action upon his motion to this end was a distinct step toward the formation of the Federal Constitution to supersede the inadequate Articles of Confederation. On the important questions of the time — trade between the States, public lands, navigation of the Mississippi, etc.— he acquired authoritative information which gave him great influence in the deliberations of Congress. Retiring from that body in 1786, he was again elected to the legislature of Virginia, and in 1788 was chosen a member of the State convention called to act upon the ratification of the Federal Constitution, which he joined with Patrick Henry and others in opposing, objecting to the centralizing features of that instrument. In 1790 Monroe was elected to the United States Senate, where he served until 1794, acting with the Anti-Federalists in earnest opposition to Washington's administration. Notwithstanding this attitude, in 1794 he was appointed minister to France, to succeed Gouverneur Morris, and on his arrival there was enthusiastically welcomed, being received with much fervor in the Convention. As his sentiments toward France at the time were far more cordial than those of his government, he allowed himself expressions before the Convention which met with strong disapproval from the administration, and his conduct in other matters not commending itself to the American government, in 1796 he was recalled. This action led to much controversy after his return, upon which he published a defense that still further strained his relations with the administration.

After a season of retirement Monroe, in 1799, was elected governor of Virginia and served three years, and in 1803 President Jefferson sent him as special envoy to France, to act with Robert R. Livingston, the resident minister, in completing the negotiations which resulted in the Louisiana Purchase (q.v.). In 1803 Monroe was also sent as minister to England; and pending negotiations there concerning the rights of neutrals and the impressment of seamen, he was ordered to Spain to adjust a question of the Louisiana boundary. Failing in this, as he had previously failed in negotiations with Spain for the purchase of the Floridas, in 1806 he was recalled to England, where a treaty was concluded which proved unsatisfactory to the President, who declined to lay it before the Senate, and upon his return to the United States in 1807 Monroe found himself once more the cause of controversy and involved in a misunderstanding, happily only temporary, with Jefferson. In 1810 Monroe was again elected to the Virginia legislature, and in the following year became a second time governor, but was soon after appointed secretary of state by President Madison. In this office he continued until his election to the presidency, during part of the time acting also as secretary of war. He served with energy and success in both departments, especially during the military operations of 1814-15.

In 1816 Monroe was elected President as the candidate of the Republican (previously Democratic-Republican) party, receiving 183 votes in the electoral college against 34 for Rufus King, candidate of the Federalists. Soon after his inauguration he made an extended personal inspection of military posts and resources, acquiring much knowledge of the condition and needs of the country, winning great popularity, and by his bearing and addresses doing much to prepare the public mind for that «era of good feeling» which made his administration memorable, and during which, in the general prosperity, political rancor was almost stilled. When four years afterward Monroe was re-elected he received all but one of the electoral votes, party divisions having largely disappeared. The President had also established himself in popular favor, especially by the acquisition of Florida from Spain in 1819, a sequel of the Seminole war.

While the eight years of his administration were not marked by stirring events, they showed important results in seaboard defense, strengthening of the army and navy, development of the country's resources, internal improvements, protection of commerce, and increased efficiency of the public service. During this period five States were admitted to the Union — Mississippi (1817), Illinois (1818), Alabama (1819), Maine (1820), and Missouri (1821). To the earlier apprehension of trouble through jealousy between the larger and the smaller States had succeeded the graver problems presented by the question of slavery, through which the «era of good feeling» was to give way to new strife of parties and sectional dissensions. The first great encounter in this conflict ended in the Missouri Compromise (q.v.), one of the chief political incidents of Monroe's administration. Yet when in 1824 Lafayette visited the United States he found here a people apparently enjoying every prospect of continued peaceful development, for it was believed that the compromise had finally settled the slavery question. But perhaps the most important result of Monroe's administration is that which followed from its expression of sympathy for South American republics, the promulgation of the Monroe Doctrine (q.v.).

His second term having ended, Monroe retired to private life in 1825, and returned to his residence in Loudoun County, Va., but he subsequently served as justice of the peace, and performed his last public service as a member of the Virginia Constitutional Convention, which met in 1829, and over which he presided until ill health compelled him to resign his membership. He removed to New York a short time before his death. From that city, in 1858, his remains were taken to Richmond, Va., and there re-interred with elaborate and befitting ceremony.

JAMES MONROE.

Fifth President of the United States.

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Consult: Gilman's biography in the 'American Statesman' series (1883; 2d ed. 1898), with bibliography of Monroe and of the Monroe Doctrine; Monroe's 'Writings,' edited by S. M. Hamilton (1898—); and the calendar of his 'Correspondence' in Bulletin No. 2, 1893, of the Bureau of Rolls and Library, State Department.

Monroe, La., city, parish-seat of Ouachita Parish; on Washita River, and on the Missouri P., and the Vicksburg, S. & P. R.R.'s; about 155 miles north by west of Baton Rouge and 55 miles east of Shreveport. It has steamer connections with a number of towns on the Washita River. It is in an agricultural section in which raising cotton and lumbering are the chief industries. There are cottonseed-oil mills, cotton compresses, brick yards, lumber mills, and wooden ware factories. There is a large trade in cotton and lumber. Pop. (1890) 3,256; (1900) 5,428; (1910) 10,209.

Monroe, Mich., city, county-seat of Monroe County; on the Raisin River, and on the Michigan S., the Père M., the Michigan C., and the Lake S. R.R.'s; about 40 miles southwest of Detroit and 85 miles southeast of Lansing, the capital of the State.

It was settled in 1784 by people from Canada, and was first called Frenchtown. In 1815 the name was changed to Monroe in honor of James Monroe (q.v.). It was chartered as a city in 1836. Here took place 22–23 Jan. 1813 the "Battle of Raisin River." The American losses in the battle were 397 killed, 537 captured; and the British losses were 24 killed and 158 wounded. Only 33 of the Americans escaped. A number of the American wounded and prisoners were left here by the British, in charge of a few soldiers. The Indians attacked and massacred all of them. The battle cry used later in the War of 1812 and afterward when disputes arose with the British, was, "Remember the River Raisin."

The city is in a fertile agricultural region and a trade centre for a large section of the southeastern part of the State. Its principal manufactures are flour, lumber, paper, paint, brick, agricultural implements, stoves, furnace products, furniture, and canned goods. The nurseries nearby and the fisheries give employment to a number of people. The chief buildings are the court-house, opera house, armory, and two orphan asylums, a home for the aged, Saint Mary's Academy, a public library, and a convent. It has the mother house of the Sisters of the Immaculate Heart of Mary, a teaching order of Sisters who have schools in various parts of the country, and whose pupils number about 10,000. In connection with the convent and academy are a large library and a fine museum. Pop. (1910) 6,893.

Monroe, N. C., city, county-seat of Union County; on the Seaboard Air Line railroad; about 120 miles, in direct line, southwest of Raleigh. It is in a cotton growing region, and nearby are gold mines. The chief industrial establishments are cotton mills, cotton gins, lumber mills, and iron works. The trade is principally in cotton, iron products, lumber, and tobacco. Pop. (1910) 4,082.

Monroe, Wis., city, county-seat of Green County; on the Chicago, M. & St. P. and the Illinois C. R.R.'s; about 40 miles south by west of Madison. It is situated in an agricultural and stock-raising region, but its manufactures are quite important. In 1859 it was incorporated as a village, and chartered as a city in 1882. The chief manufactures are creamery products, condensed milk, machine-shop products, wagons, carriages, lumber, and foundry products. The trade is principally in the manufactures of the city, farm and dairy products and live-stock. It has good schools and a fine public library which contains about 5,000 volumes. Pop. (1910) 4,410.

Monroe Doctrine. The term Monroe Doctrine has been popularly used for three different principles which at different times have governed the policy of the United States toward Latin America: they are (1) the declaration made in 1823 by President Monroe; (2) various theories of our relations to Latin-America, which theories by several presidents and secretaries of state from 1845 to 1885 have been set forth as forms of the Monroe Doctrine; (3) the general doctrine that the United States has a "paramount interest" in American affairs, a doctrine rapidly developed since 1890.

I. The original Monroe Doctrine grew out of the political conditions of America in the first quarter of the 19th century. In 1823, by a series of revolutions, Spain had lost all her American possessions except Cuba and Porto Rico; Portugal had lost Brazil; France had lost the Island of Haiti; so that England, the United States, and Russia were the only world powers which had large territories and the hope of development in the new world. Toward the dozen so-called states formed out of the ruins of the Spanish and Portuguese empires, the United States felt a natural and lively sympathy, first because most of them were in form republics, and were expected to follow the United States in maintaining popular governments; secondly because the trade of those countries, which had been as far as possible reserved by Spain, was now open to the world, and was valued by the people of the United States.

Europe, in the meantime, after the fall of Napoleon, went into the hands of a great political alliance formed by Austria, Russia, Prussia, and France, and cemented by a treaty called "The Holy Alliance" (1815); this was in effect a system of mutual political insurance, under which, in case of revolution anywhere in Europe, the forces of the allied powers could be used to put it down. A revolution in Spain in 1820 called for the intervention thus arranged in advance, and in 1823 a French army overwhelmed Spain and again placed in power the sordid tyranny of the Bourbons.

So far, the United States was not directly involved; but in 1823 the Spanish Bourbons asked the aid of the Holy Alliance to restore their authority in America; and the United States justly feared that France would undertake this commission, and would receive Cuba as the price of the service, thereby securing a new foothold in America, and a rich island almost overlooking the American coast. Just at this time a question arose as to the possession of the northwest coast of America, where Russia claimed not only a liberal stretch of coast reaching almost to San Francisco, but also the right to keep the vessels of other powers out of the north Pacific Ocean (Ukase of 4 Sept. 1821).

The leading mind in the cabinet of Monroe was not the president, but John Quincy Adams, secretary of state, who saw the great significance, both of intervention in the established Latin-American states, and also of European claims to wild territory in America. England was also interested in unrestricted trade with the Spanish-American countries, and in 1823 George Canning four times proposed to the United States to join England in a declaration against intervention, and Monroe was inclined to accept the proposal. After long cabinet discussion, Adams convinced the President that it would be better to make an independent declaration. Adams' papers show that he not only suggested but formulated most of the important presidential message of 2 Dec. 1823, several passages in which, construed together, constitute the original and genuine Monroe Doctrine. The message includes substantially the following principles: (1) Isolation: there are two spheres of world influence, separated by a meridian drawn through the Atlantic Ocean; two political world entities, with different sets of interests; and since the United States takes no part in the affairs of the European sphere, European powers ought to keep out of American affairs. (2) Colonization: "the American continents, by the free and independent condition which they have assumed and maintain, are henceforth not to be considered as subjects for future colonization by any European powers." This was directed against Russia, and specifically excepts "the existing colonies or dependencies of any European power." (3) Intervention: the message assumes that the Latin-American states are permanently independent, and capable of conducting civilized governments; and explicitly and strongly protests against "any interposition for the purpose of oppressing them, or controlling in any other manner their destiny, by any European power." (4) Political system: it would be hostile and dangerous to the United States if "the allied powers should extend their political system to any portion of either continent." This clause plainly refers to the mutual assistance given by members of the Holy Alliance. (5) John Quincy Adams undoubtedly desired that the United States should exercise a political leadership over the other American states, but such a principle is not embodied in the message.

The original Monroe Doctrine was at once effective. Canning was so much interested in the result that he claimed it for himself and said (21 Dec. 1826): I looked another way . . . I sought for compensation in another hemisphere. . . . I called the new world into existence to redress the balance of the old." In reality the United States had struck out a policy for itself. European intervention was abandoned; but when our Latin-American neighbors attempted to get a more distinct promise of military protection, in the Panama Congress of 1826, the United States took the ground that our neighbors must protect themselves, in case of a fight with European powers.

II. The second phase of the Monroe Doctrine began about 1845, because a new set of conditions came about in America. In 1824 and 1825 Russia withdrew all her claims on the Pacific coast south of 54° 40'; Cuba remained safe in the hands of Spain; and France soon ceased to be an important factor in American affairs. The commerce of the United States increased with all her neighbors. Furthermore the United States assumed new importance in America by the annexation of East Florida in 1819; by the successful assertion of claims to Oregon from 1805; by the annexation of Texas in 1845; and by enormous growth of population and power. In the Mexican War, in 1846, the United States abandoned any right to stand as the special champion or defender of the integrity of Latin-American states, for we invaded and seized Mexican territory.

To meet these new conditions President Polk and other presidents and secretaries of state after him, laid down principles which they held to be a reiteration of the Monroe Doctrine. The annexation of California raised a new question of American policy, by calling attention to the need of a line of transit shorter than the 14,000 mile voyage around the Horn. In formal terms President Polk several times quoted phrases of Monroe's doctrine, and attempted to show that a policy of aggression on our neighbors was a duty prescribed by that doctrine. (Inaugural Address, 4 March 1845; message, 2 Dec. 1845.) In a special message (29 April 1848) he advocated the annexation of Yucatan, on the ground that the Monroe Doctrine required us to take over territory which otherwise might go to European powers. More significant than these appeals to Monroe was the treaty of 12 Dec. 1846 (ratified 10 June 1848), with New Granada (now Colombia), under which the United States received the right to use, and to maintain order on, any transit line by water or land across the Isthmus of Panama. Another evidence of interest in the rest of America was the Clayton-Bulwer treaty with England (19 April 1850), by which the United States agreed to share with Great Britain the responsibility of guaranteeing any Isthmus communication, and secured from Great Britain a pledge not to exercise any exclusive control over the Nicaragua route. These two ideas of a special guaranty and of a joint guaranty were clearly not covered by, nor contemplated by, Monroe's message of 1823.

A few years later, however, precisely the case which was in Monroe's mind arose. In 1861 France sent an armed force into Mexico, ostensibly to enforce claims, really, as it soon proved, to found a French dependency in America, at a time when the United States was completely occupied in civil war. Secretary Seward in his despatches several times referred to the "tradition" of the United States, to the objection to "foreign occupation," and to "attempts to control" the destinies of republics in America; but though he undoubtedly had Monroe's message in mind, he never mentioned it, probably because he thought that Seward could expound as good a doctrine as Monroe. At the end of the Civil War a large force of troops was directed to the Mexican frontier, and the French were warned by Seward that the time had come to leave the country; with great regret they obeyed the warning. An increasing sense of interest in Central America was shown by Seward's attempts to secure for the United States a foothold for our control of an Isthmus canal. Treaties were made with Honduras (4 July 1864) and with Nicaragua (21 June 1867), by which the United States was to have large rights of control over any canal constructed through either of those countries; and a treaty with Colombia for exclusive rights of control (14 Jan. 1869) failed in the Senate. At the same time Secretary Seward enlarged the territory of the United States by the annexation of Alaska (treaty of 30 March 1867); but his two attempts to get a West Indian naval station to flank the route to the Isthmus were not successful; the Danish treaty (of 24 Oct. 1867) for the cession of Saint Thomas and Saint John was rejected by the Senate; and the negotiations with San Domingo for Samana Bay were abortive.

When General Grant came to the presidency in 1869 he and Secretary Fish revived with great vigor both lines of the previous diplomacy. In 1870 he negotiated a treaty with Colombia to give us exclusive control over a Panama canal; but it was not ratified. Into a plan for the annexation of the eastern end of the Island of San Domingo Grant threw himself with great earnestness, appealing in several special messages (31 May, 13 June, 5 Dec. 1870, 5 April 1871) to Monroe's doctrine; and Secretary Fish (14 July 1870) laid down the doctrine that the United States "occupy of necessity a prominent position on this continent . . . which entitles them to a leading voice"; but the Senate was not convinced either that the interests of the United States or the Monroe Doctrine required such an annexation.

The applicability of the Monroe Doctrine to the canal question was raised again in 1879 when it was announced that a French company had acquired a concession for a Panama canal and stood ready to build it. Secretary Evarts (8 March 1880) declared roundly that the United States "had a paramount interest" in an Isthmus canal; and President Hayes in a special message (8 March 1880) held that any canal must be "virtually a part of our coast line," and hence a matter "of paramount concern to the people of the United States." A few years later Secretary Blaine in several despatches (7 May, 24 June, 19 Nov. 1881), and Secretary Frelinghuysen (8 May 1882), repeated phrases of Monroe's message, as governing the Isthmus canal.

III. The bankruptcy of the French Panama Canal Company in 1889 somewhat relieved the pressure for the control of the canal and of its West Indian approaches; but in 1895 the Monroe Doctrine was appealed to in a novel way, as controlling a long-standing boundary controversy between Venezuela and the neighboring British colony of Guiana. The United States had repeatedly offered its good offices, and suggested arbitration; inasmuch as Great Britain took no heed, Secretary Olney (20 July 1895) protested against any attempt of a European power to extend its boundary over territory claimed by an American power, because (he said) the Monroe Doctrine provided "that no European power or combination of European powers shall forcibly deprive an American state of the right and power of self-government."

Beyond any previous enunciation of the Monroe Doctrine, Mr. Olney made the statements that "distance and 3,000 miles of intervening ocean make any permanent political union between an European and an American state unnatural and inexpedient"; and that "to-day the United States is practically sovereign on this continent, and its fiat is law upon the subjects to which it confines its interposition:" all these doctrines Mr. Olney believed to be "the accepted public law of this country." This despatch was fortified by a message from the president (17 Dec. 1895), in which he held that "since in international councils every nation is entitled to the rights belonging to it, if the enforcement of the Monroe Doctrine is something we may justly claim it has its place in the code of international law." He hinted at war as the penalty if Great Britain declined to heed this remonstrance.

Mr. Olney's doctrine was certainly not the original Monroe Doctrine. It is really the laying down of a new principle; namely, that Great Britain, which through its possessions in Canada and the West Indies has for a century been an important American power, is no longer to exercise influence on the future of Central and South America. That lesson Great Britain took to heart, for she accepted the proposed arbitration (by which nearly all the territory in dispute was assigned to Great Britain); and in the Spanish war of 1898 Great Britain was solicitous to make it clear that she would not, and other European powers must not, interfere with the American policy of the United States. As the result of that war, the United States acquired a West Indian station in Porto Rico; and the new attitude of Great Britain led to the first Hay-Pauncefote treaty of 5 Feb. 1900, by which Great Britain agreed to give up the joint control over Isthmus transit, which was provided by the Clayton-Bulwer treaty of 1850. The new arrangement was not satisfactory to the Senate, and hence a second treaty was negotiated (18 Nov. 1901), by which the Clayton-Bulwer treaty was declared abrogated and the United States was left free to control any Isthmus canal, and to "neutralize" it in her own way.

Germany has for some years been looking eagerly about the world for an opportunity to plant colonies, and was supposed to have a special interest in the South American countries. An unofficial and unpublished understanding was reached, however, with the United States, by which Germany undertook to make no conquests or settlements in South America. Hence, in December 1902, the United States offered no objection, and made no appeal to the Monroe Doctrine, over an occupation and bombardment of the ports of Venezuela by German, English, and Italian warships; the ground taken by President Roosevelt was that the Monroe Doctrine was not intended to protect American states from responsibility for their own defiance of the principles of civilized intercourse; but it was understood that the United States would under no circumstances permit the occupation of interior American territory even for a short time.

A few months later (22 Jan. 1903) Secretary Hay negotiated a treaty with Colombia for the construction and exclusive control of a Panama canal. The treaty was rejected by the Colombian government, and (3 Nov. 1903) the people of Panama revolted and set up a new republic, which was on 13 November recognized by the United States. The leading European governments at once followed in recognizing the new power, on the evident principle that the United States was the only great power which had responsibility for the relations of Latin-American states with each other. (See PANAMA.)

The Monroe Doctrine, so-called, has thus passed through many changes, ranging from the negative idea of Monroe that the United States was to see fair play in America, to the positive and aggressive plans of Polk and Fish, who asserted the right of the United States to enlarge at the expense of our neighbors; and thence to the broader doctrine of Olney and Hay that the United States must settle the interior affairs of America without interference from, or suggestions from, European powers. This doctrine has become a principle of American state policy which is courteously recognized by all other great powers.

Bibliography. — Reddaway, 'The Monroe Doctrine' (1898); Travis, 'Clayton-Bulwer Treaty' (1900); Roosevelt, 'American Ideals' (1897); Henderson, 'American Diplomatic Questions' (1901); Hart, 'Foundations of American Foreign Policy' (1901); Dana, 'Wheaton's International Law' (1866, §§ 67–76). The best sources will be found in John Quincy Adams, 'Memoirs' (vi. 163, 177–179, 186–216); Ford, in 'American Historical Review' (vii. 676, viii. 28); and in 'Messages and Papers of the Presidents.'

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Monrovia, mŭn-rō'vĭ-ạ, Liberia, the capital of the republic, a commercial and seaport town, on Cape Mesurado near the mouth of the St. Paul's River. It was named after James Monroe, President of the United States. Pop. 5,000.

Mons, **môṅs,** **Belgium,** the capital of Hainault, on the Trouille, 38 miles by rail southwest of Brussels. An encircling belt of promenades occupies the site of the fortified ramparts demolished in 1862. The Canal de Condé connects Mons with the Scheldt. The church of St. Waddru (1450–1589) is a masterpiece of Gothic; and there are a town hall (1458), a belfry (1662) 275 feet high, a good library, etc. The manufactures include woolen and cotton goods, cutlery, hardware, and sugar; while in the vicinity is the extensive coal field of Borinage. Mons, occupying the site of one of Cæsar's camps, was made the capital of Hainault by Charlemagne in 804. France, Spain, and Austria often contended for its possession. Pop. about 28,000.

Mons. See Mensa.

Monseigneur, môṅ-sā-nyėr (French, my lord), a title of dignity in France. Before the revolution the king's oldest brother was styled *monseigneur.* Princes, dukes and peers, archbishops, bishops, cardinals, marshals of France, presidents of parliament, etc., were addressed by this title.

Monsell, mŭn'sĕl, **James Samuel Bewley,** English Protestant Episcopal clergyman and hymn-writer: b. Londonderry, Ireland, 2 March 1811; d. Guilford, England, 9 April 1875. He was graduated from Trinity College, Dublin, in 1832, and took orders in the Church of England in 1875. As a writer of hymns he became famous, over 100 of his hymns still continuing in popular use. Among his publications are: 'Parish Musings'; 'Simon the Cyrenian and Other Poems'; 'Spiritual Songs'; 'Our New Vicar' (1867, 13th ed. 1890).

Monsignore, mŏn-sē-nyō'rĕ, a title of honor given to prelates of the Roman Catholic Church. Formerly in France the corresponding title of Monseigneur was allowed to all high dignitaries of the Church.

Monson, mŭn'sŏn, Sir **Edmund John,** British diplomat: b. Chart Lodge, Kent, 6 Oct. 1834; d. 29 Oct. 1909. He was educated at Eton and Balliol College, Oxford; was fellow of All Souls, Oxford, 1858; had entered diplomacy in 1856; held various minor posts, as attaché or under-secretary, until 1876, when he was sent on special service to Dalmatia and Montenegro. He was minister to Uruguay (1879), to Argentina and Paraguay (1884), to Denmark (1884), to Greece (1888), and after acting as arbitrator of the Butterfield claims between Denmark and the United States in 1888, minister to Belgium 1892, ambassador to Austria 1893, and later to the French Republic. He was made a privy councillor in 1893.

Monsoons, mŏn-soonz', in meteorology, are certain trade winds, operative from the tropic of Cancer to lat. 7° S., and from the coast of Africa through the Indian Ocean and the Bay of Bengal to Japan and the Western Pacific. There are two monsoons, the southwestern and the northeastern. The latter prevails from October to April, and the former from April to October. Monsoons are caused by the unequal heating of the land and water and of the several land masses themselves in the regions which they affect. Independently of their great use in bringing rain to countries which otherwise would degenerate into deserts, they are useful for navigation. As in the case of the trade winds, navigators can so plan their voyages as to take advantage of the monsoons, though powerful steamships can now achieve the feat of running in the teeth of the monsoon, but not without some discomfort to those on board.

Monsters. See Teratology.

Mon'strance (Latin, *monstrare,* to show), called also *ostensorium* or *expositorium,* the sacred vessel in which, in the Roman Catholic Church, the host is shown to the people, through a glass-covered opening, at benedictions, processions, and other solemnities. Its use dates from the institution of Corpus Christi Day (1264) by Pope Urban IV. It was not until after the Council of Cologne 1452 that the consecrated wafer was exhibited to the people, having been previously deposited in the ciborium which enclosed and concealed it.

Mont Blanc, môṅ blôṅ (white mountain), France, a mountain, the loftiest of Europe, belonging to the Pennine chain of the Alps, and rising 15,781 feet above sea-level, the main portion and the highest summit being in France (Haute Savoie), 7 miles south of the Switzerland frontier. It forms a huge mass stretching northeast and southwest, in which direction the boundary line between France and Italy runs along it. Its northeastern extremity enters Switzerland. In this latitude the snow line is at 8,000 feet; consequently 7,700 feet of the mountain are within the region of perpetual snow and ice. Its shape, when seen on the north or south, is pyramidal. On the southeast it presents an immense wall-face, on which few glaciers can be formed. These, of which 18 in all are counted, are chiefly on the northwest slope, where the glaciers Des Bossons, Bois, Talèfre, and Mer de Glace are seen. The mass of the mountain consists almost entirely of granite. In 1760

Saussure offered a prize for the discovery of a practicable passage to the summit, which was reached by Jacques Balmat, a guide, June 1786. The “Grande Ascente” is now an ordinary tourist excursion, regularly made every season by great numbers, and is less hazardous than commonly supposed, unquestionably due to the precautions taken by government to ascertain the qualifications of the guides, and regulate the mode of ascent. In 1893 an observatory was erected on the summit of the mountain by Pierre Janssen.

Mont Cenis, môṅ sē-nē, or **Monte Cenisio.** See CENIS, MONT.

Mont Cervin, môṅ sĕr-văṅ. See CERVIN, MONT.

Mont Pelée, môṅ pā-lā. See PELÉE, MONT.

Mont-de-Piété, môṅ-dė-pē-ā-tā (in Italian *Monte di Pietà*), an authorized licensed or government pawnshop; a bank of charity which lends money on pledges at a low rate of interest, and whose aim is purely philanthropic. The chief customers of such institutions, which are found in France, Italy, Germany, and other continental countries, are workmen pressed by a temporary failure of employment; small tradesmen without a bank account; or travelers in a large town whom some accident has subjected to a momentary strait; to all of whom it is a matter of necessity to conceal any compromise of their position in procuring money for present necessities. These institutions were established to prevent the scandal and abuse of usury. They date their origin from the Middle Ages, when the loan of money on pledges was almost exclusively in the hands of the Jews. They originated in Italy about 1450, and not long after were approved by several papal bulls. Several French and Italian cities possessed monts-de-piété in the latter half of the 15th century, among others, Mantua, Parma, Milan, Rome, Padua, Trèves, Boulogne, etc. The French monts-de-piété, with the exception of those of Montpellier, Toulouse, Grenoble, and Angers, which lend without interest, exact interest at the rate of from 4 to 12 per cent. The chief mont-de-piété in France is that of Paris, which transacts a greater amount of business than all the rest together. It is said to receive in pledge as many as 1,000 to 1,200 watches a day. In the United States and Great Britain pawnbrokers take the place of monts-de-piété, which were introduced in the beginning of the 18th century, but failed. See also PAWN-BROKERS.

Mont-Saint-Michel, môṅ-săṅ-mē-shĕl, France, a famous seat of learning and pilgrimage resort of Normandy as early as the 12th century, now an equally celebrated tourist resort. It consists of a collection of mediæval houses, hostelries, ecclesiastical buildings, and fortifications, grouped on a conical rock in the Bay of Cancale or Saint Michel, at the mouth of the Couesnon River, here forming the boundary between Normandy and Brittany, 15 miles southeast of Granville. Anciently a lofty hill in the Forest of Scissy which was submerged in the 7th century by a tidal cataclysm, the rock in prehistoric times was crowned by a Celtic temple; it was the Roman *Mons Tumba,* and the “*mons in periculo maris*” — the mount in danger of the sea — of the monastic chroniclers. The Bay of Saint Michel, 15 miles wide at its mouth, and 8 miles long from north to south, is nearly dry at low water, but fills with treacherous rapidity at flood tide. In 1880 a dyke nearly a mile long was completed which connects the Mont with the mainland. Ramparts, towers, and bastions of the 16th century encircle the base of the rock which has a circuit of about two miles, and the entrance is through a gate which opens on the single, narrow, winding street of a small village (pop. 1901, 235) built around the southern slope and leading by several flights of stone steps to the fortified abbey on the summit. Crowning the abbey is a superb 15th century Gothic church, a fine statue of the Archangel Michael capping the spire, which towers conspicuously 250 feet above the wide expanse of sandy bay and low-lying country around. Saint Aubert, bishop of Avranches, founded the abbey in 709 and his first chapel, restored, is on a rocky projection on the north side of the Mont. In 1203 the abbey was destroyed by Philip Augustus, and the present buildings date from that period. It was an important fortified post during the English and religious wars and was successfully defended against all assaults by the Knights of the Order of Saint Michael. At the Revolution it was converted into a prison for political offenders, and now ranks as one of the protected historical monuments of France. An elaborate process of restoration extending over several years is gradually renewing its ancient strength and beauty. Among the chief features of the Mont are the abbey church, elaborately decorated cloisters, La Merveille “the marvel,” or massive north wall of the abbey, the Salle des Chevaliers, the Châtelet or guard house, the crypts with their remarkable columns, the cellars, the dungeons, the mediæval elevator with its enormous hoisting wheel formerly operated by a donkey, etc.; and in the village the ancient parish church, a museum, the famous Porte du Roi, and Duguesclin's Tower.

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Montagna, Bartolommeo, bär-tō-lŏm-mā'ō mōn-tän'yä, Italian painter: b. Orzinovi, near Brescia, about 1450; d. Vicenza 11 Oct. 1523. He settled at Vicenza in 1480, was influenced by Bellini, Carpaccio and Andrea Mantegna, worked in Padua and Verona, and from 1496 until his death was again in Vicenza, being the first great master resident there. His work in general resembles the earlier Venetian school, is serious, marked by distinctness, power and severity of drawing, and has harmonious coloring in which a brown gleaming tint is noticeable. The human form is almost always shown as overmuscular. His principal works are the ‘Madonna and Child’ at the Venice Academy, ‘Ecce Homo’ at the Louvre, and frescoes in the church of San Nazaro at Verona.

Montagnais (môṅ-tän-yā) **Indians,** a general name applied to several American Indian tribes. One of these was of the Athapascan family in British North America, the most of whom were Christianized by Roman Catholic missionaries. Another and the best known tribe of this name, was of the Algonquian family, and resided along the shores of the Saint Lawrence River. They have practically disappeared in recent years.

Montagnards, môn-täṅ-yär, a popular name in French history, applied in 1793 to the extreme democratic party. Soon after the fall of Robespierre the denominations of «Montagnard» and «Montagne» gradually disappeared from party nomenclature. An attempt was made by the extreme party in the National Assembly, after the revolution of 1848, to revive the title, but it was a pure anachronism.

Montagu, mŏn'ta-gū, **Andrew Jackson,** American lawyer and politician: b. Campbell County, Va., 3 Oct. 1862. He was graduated from Richmond College in 1882 and studied law taking the degree of B.L. at the University of Virginia. He was admitted to the bar and began the practice of law in 1885; from 1894 to 1898 he was United States district attorney for the western district of Virginia, and in 1898–1902 attorney-general of the State. In 1902 he was elected governor of Virginia for a term of four years. He has been one of the foremost advocates of direct primaries to prevent party machine rule. He has also been active in the movement for improved popular education in the South, and has given many public addresses throughout the State, advocating the increase of educational facilities for all without regard to race or creed.

Montagu, Elizabeth Robinson, English author and society leader: b. York 2 Oct. 1720; d. London 25 Aug. 1800. In 1742 she married Edward Montagu, grandson of the first Earl of Sandwich, who died leaving her a fortune. To wealth she added literary accomplishments, and these, joined to other personal qualities, enabled her to secure her social leadership. Among her visitors and associates were Lord Lyttelton, Samuel Johnson, Horace Walpole, Burke, Sir Joshua Reynolds, Garrick, Hannah More, and other celebrated persons. To the gatherings at her house the term blue-stocking (q.v.) is said to have been first applied. Three of the dialogues in Lord Lyttelton's ‘Dialogues of the Dead’ were written by her in 1760. She also wrote an ‘Essay on the Writings and Genius of Shakespeare, compared with the Greek and French Dramatic Poets’ (1769). Much of her correspondence was published (1809–13). Consult the ‘Memoirs’ of Elizabeth Carter (1816), and Doran, ‘A Lady of the Last Century’ (1873).

Montagu, Lady **Mary Wortley,** English author: b. 1689; d. 21 Aug. 1762. She was the eldest daughter of Evelyn Pierrepont, afterward Duke of Kingston. She learned Latin very early, and also became versed in English literature, especially its romance and drama. The Kit-Cat Club (q.v.) by acclamation admitted her to membership. In 1712, without the consent of her father, she married Edward Wortley Montagu, a wealthy Whig scholar, with whom the former had quarreled. On the accession of George I. in 1714 Montagu obtained an official position in London, and Lady Mary came out from the seclusion in which she had lived. Her beauty, wit, and vivacity gained her admiration and influence, and she became familiarly acquainted with Addison, Congreve, Pope, and other distinguished writers. In 1716 her husband was appointed ambassador to Turkey, and Lady Mary accompanied him to Constantinople, where they remained from January 1717 to May 1718. During this period her famous ‘Turkish Letters’ were written. On her return to England she re-entered the world of wit and fashion. She had a quarrel with Pope, and a long and keen literary war ensued, which did honor to neither. In 1739, for reasons never satisfactorily explained, she left England to live on the Continent. This she did with the full concurrence of her husband. She lived chiefly in Italy until her husband's death in 1761, and soon after her return to England she herself died. Her letters are marked by great sprightliness, combined with graphic power and keen observation, and with independence of judgment. Lady Mary has another claim to remembrance in her courageous adoption for her own children of the Turkish practice of inoculation (q.v.) for smallpox, and for her energy in promoting its introduction into England, in the face of violent prejudice. Consult her ‘Works,’ edited by Lord Wharncliffe, her great-grandson (1837, latest ed. 1893).

Montague, Mass., a town including several villages, in Franklin County; on the Connecticut River, and on the Central Vermont and the Fitchburg railroads; about 35 miles north of Springfield. The most important village in the town is Turner's Falls. Montague was settled about 1716 and in 1753 was incorporated as a district. It is in an agricultural and manufacturing region. The chief industrial establishments are large cotton mills, paper and pulp mills, brick, water-wheels, hardware, cutlery, pumps, toilet articles, soap, and machinery. There are two public libraries. The government of the town is determined by popular vote at regular town meetings. Pop. (1890) 6,296; (1900) 6,150; (1910) 6,866.

Montaigne, mŏn-tān' (Fr. môṅ-tān-yĕ), **Michel Eyquem de,** French essayist: b. Château Montaigne, Périgord, 28 March 1533; d. there 11 Sept. 1592. He was educated by his father after a fashion all his own, learning Latin from house servants who never spoke French and being roused from bed every morning by soft music. At six he was sent to the Collège de Guyenne in Bordeaux, where he stayed for seven years apparently under the charge of the great classical scholars Buchanan and Muretus. Thereafter he probably studied law at Bordeaux and Toulouse, and when he came of age was made a member of the Cour des Aides at Périgueux. This court was abolished three years afterward and Montaigne with the other members was appointed counsellor to the Bordeaux parliament, a body in which he made the acquaintance of La Boétie about 1559. For the next few years he was at court now at Paris, now at Bar-le-Duc; we know that in 1562 he swore allegiance to the Catholic Church on his own motion, that in 1565 he married Françoise de la Chassaigne, daughter of one of his fellow counsellors, and that the death of La Boétie in 1563 and that of his father in 1568 had greatly lessened Montaigne's interest in public affairs. These events had also no doubt sobered him — he admits that his youth had been wild; at any rate in 1571, having prepared La Boétie's posthumous works for the press, having received himself the order of St. Michel for a rather mediocre version of the ‘Theologia Naturalis’ of Raymond de Sebonde, his only literary venture so far, after selling his post as counsellor, he retired to Montaigne. There he began, and in the next nine years completed, the first two books of his essays, whether purposing them for publication or not is unknown, though their style seems to point to the fact that in their earliest form they must have been mere jottings in a commonplace book. By the middle of 1580 his health had so much failed that he left Château Montaigne for the first time since 1571, save for an occasional trip to Paris, and traveled through Switzerland, Germany, and Italy, meeting Tasso at Florence. His 'Journal' of this trip, discovered and published in 1774, adds nothing to his literary fame and not much more to our knowledge of his personality. During this absence from France, and apparently quite against his will, Montaigne was elected mayor of Bordeaux; he served in this office from 1581 to 1583 and then was re-elected for another two years; at the close of this successful administration, in which with no small skill he had steered safely the king's lieutenant in Guyenne and the king of Navarre, governor of the province, he refused to be present in the city as was required for the election of his successor, because of the plague — one of the few lights on his personal character and not a pleasant one. The three years immediately following (1585–8) were occupied in the revision of his two books of essays and the addition of a third. He received the rites of the Church upon his death-bed. His wife bore him several children; "two or three," he says, died in infancy; and one, a daughter of whom he was very fond, survived him. But his family ties were not strong; his life with his wife seems to have been a philosophic makeshift; and his love for his daughter can not compare with his attachment to a Parisian girl, Mlle. de Gournay, who was attracted to him by his literary fame, was called by him his adopted daughter, and was fortunate enough to receive from Montaigne's widow a copy of his 'Essays' with manuscript additions and corrections, the basis of a new edition, published in 1595. Montaigne's literary reputation is safe, though in the hands of the few, not the many. His spirit is skeptical, essentially typical of his time, and it was not for nothing that his study at Château Montaigne was decorated with texts from Ecclesiastes, Ecclesiasticus, Lucretius and Horace, for he was akin to these ancient writers who proclaim the vanity of all things. His theme is varied, his treatment discursive, and his charm largely due to this very variety, together with a quaintness and raciness of style that did much for French prose and was mostly original even if patterned on Amyot. His manner of approaching the questions of life and criticism is apparently purely subjective; indeed, his delightful egoism that makes his own life, experiences, and thoughts the theme of the essays seems at first to be quite independent of so serious a purpose. But this subjective manner brings him nearly as close to the analysis of universal problems as does the dramatic objectivity of a Shakespeare. His entire attitude is skeptical, but he is not to be ranked as the enemy of religion. He is the curious, interested skeptic, not the doubting cynic. Prof. Saintsbury well says that the nearest spiritual parallel to Montaigne in literature is Charles Lamb.

Montaigne affected English literature scarcely less than he did French. His essays, translated by Florio (1603), seem to have been known to Shakespeare in their English form, and this same version, revised by Hazlitt (1893), is still the standard in English. The best editions of the original are those by Amaury-Duval (1820) and Le Clerc (1865). Consult the appreciations by Emerson, 'Representative Men' (1850); Church, 'Miscellaneous Essays' (1888); Pattison, 'Essays' (1889), and Pater, 'Gaston de Latour' (1896); also Bonnefon, 'Montaigne et ses Amis' (1892); Stapfer, 'Montaigne' (1894); Lowndes, 'Michel de Montaigne' (1898); Guizot, 'Montaigne' (1899); Champion, 'Introduction aux Essais de Montaigne' (1900).

Montalembert, Charles Forbes de Tryon, shärl fôrb dė trē-ôṅ môṅ-tä-lôṅ-bār, Comte de, French publicist and historian: b. London, England, 29 May 1810; d. Paris 13 March 1870. He received a university education at Paris; identified himself with the Liberal Catholic movement of Lamennais (q.v.) and Lacordaire (q.v.), whom he assisted in establishing (18 Oct. 1830) and editing 'L'Avenir' and in efforts to obtain the freedom of education at that time impossible under the state system, and in 1831 went with these two leaders to Rome to present their cause. On his return he opened with Lacordaire and De Coux at Paris a free Catholic school, which was promptly closed by the police, while the directors were arraigned for infringement of the laws respecting instruction. Montalembert made a notable defense before the Chamber of Peers, but the directors were sentenced to pay the costs and 100 francs apiece in fines. When the doctrines of 'L'Avenir' were condemned by Gregory XVI. in an encyclical of 15 Aug. 1832, Montalembert duly submitted and did not proceed with Lamennais to final revolt. He entered the Chamber of Peers in 1835, spoke much and eloquently on ecclesiastical matters, and in 1836 published his 'Histoire de Sainte Elizabeth de Hongrie,' which appeared in an English rendering by Hackett and Sadlier (1854). His Catholic zeal was combined with liberal ideas and after the revolution of 1848 he was elected as a Moderate Republican to the Constituent Assembly; but here, as in the Legislative Assembly, where he sat from 1849 to 1857, he became more and more conservative. In June 1851 he debated against Victor Hugo in opposition to the proposed constitutional revision. He found himself unable to support the measures of the Empire; was known as one of the most determined opponents of Napoleon III.; and for an article, 'Un Débat sur l'Inde au Parlement Anglais,' unfavorably contrasting French and British institutions, was sentenced to six months' imprisonment and a fine of 3,000 francs, though the penalty was remitted. His chief work is 'Les Moines d'Occident depuis St. Bénoît jusqu'à St. Bernard' (1860–7; Eng. trans.), which, though of much value, has been criticized as in general too argumentative and oratorical in manner to fulfil the highest demands of history. He wrote many pamphlets, the last of which, 'La Victoire du Nord aux Etats-Unis' (1865; Eng. 1866), was an appreciation of the triumph of the Union cause in the Civil War. He opposed in a letter of 28 Feb. 1870 the opportuneness of the definition of the doctrine of Papal infallibility, but acquiesced at once when the dogma was published. Consult the memoir by Mrs. Oliphant (1872); the study by De Meaux (1897); Craven, 'Le Comte de Montalembert' (1873).

Montana, mŏn-tä'na, the "Treasure State" (admitted to the Union 8 Nov. 1889), is bounded north by British Possessions, east by North Dakota and South Dakota, south by Wyoming and eastern Idaho, west by Idaho. Capital, Helena; area, 146,080 square miles (about 1,000 of it water); population (1910) 376,053, including about 11,000 Indians and 5,000 Chinese, Japanese, and Negroes.

Topography.— The State has within its borders 93,491,200 acres of land. Of this amount about 26,000,000 acres are classed as mountain lands, 30,000,000 as farming lands, and 38,000,000 as grazing lands. This is approximately 40,000 square miles of mountains, 50,000 square miles of farming lands and 56,000 square miles of grazing lands. The mountain area of the State is about equal to the area of either Indiana, Kentucky, Virginia, Ohio or Tennessee; its grazing land is more than the area of either Pennsylvania, Louisiana, Mississippi or New York; its farming land is as much as the area of either Wisconsin, Iowa, Illinois or Michigan. The mountain area is largely in the western part. The main range of the Rocky Mountains enters the State about a hundred miles east of the State line, and extends across the State from northwest to southeast, forming the boundary line between Montana and Idaho for several hundred miles — from 114th meridian to the Yellowstone Park. The crest of the range is quite tortuous, and contains many peaks. West of the main range of the Rockies are several smaller ranges. The Bitter-Root Mountains form a large part of the boundary between Montana and Idaho, from 48th parallel to juncture with the main range of the Rockies. The northern portion of the State west of the main range includes the Kootenais, which extend northward into the British Possessions. Between the Kootenais and the Bitter-Root range are the Cabinet Mountains, extending approximately southeast and northwest, continuing westward into Idaho. They form the western boundary of the Flathead Indian reservation, the lower summits blending with the Mission range near Missoula. The Mission range extends almost due north and south for about a hundred miles, the northern end beginning in the valley at the upper end of the Flathead lake, rising higher and higher toward the south, culminating in the McDonald Peak (9,800 feet), Sinyaleamin Peak (9,500 feet), and McLeod Peak (8,500 feet). East of the Mission range lies the Swan range, extending almost parallel with the former, and continuing some 30 or 40 miles farther north. Like the Mission Mountains, the Swan range is highest at the southern end, culminating in Swan Peak (10,000 feet). East of the main range are many smaller ranges, foothills leading from the Great Plains to the Continental divide, with its high and snowy peaks. The Big Belt Mountains form the boundary between Meagher County on the east side, and Broadwater and Lewis and Clarke counties on the west. The range extends northwest and southeast for more than a hundred miles. In the southwest angle of the State, adjacent to the National Park, are many small ranges, including the Ruby Mountains, the Tobacco-Root range, the Snow-Crest range, the Madison range, the South-Boulder range, the Gallatin range, Bridger Mountains and Snow Mountains. Near the Wyoming line on the south is the small Bear-Tooth range, the Prior Mountains, the Rosebud range, with a high plateau in the southeast corner. The Little Belt Mountains form a large portion of the boundary between Meagher County and Fergus and Cascade counties. Between this range and the Big Belts lie the small Dry-Range and Elk Mountains, while the Crazies are further to the southeast, and are the first high summits to greet the traveler on the Northern Pacific railroad as he speeds westward between Big-Timber and Livingston. Fergus County, in the central part of the State, is as large as the State of Massachusetts. It contains the Big Snowy and Little Snowy ranges and the Moccasin Mountains. North of the Missouri River the State is largely a great plain, broken by the Bear-Paw range, culminating in Mount Garfield (5,794 feet), and the Cherry Patch hills at the northern boundary. The mountains contain many high peaks, the more lofty being in the Yellowstone Park (q.v.) region. Much of the mountainous region is yet unexplored save by the hardy trapper and prospector. The transcontinental railroads give the traveler a poor idea of the sublimity of the scenery which the many mountain ranges afford. Many of the snow-clad peaks bear on their sides the remnants of glaciers with miles of blue ice with huge crevasses, where the Alpine climber may find untrodden and unnamed fields, where the blue lakes reflect the azure depths of heaven, and where the botanist, the zoologist, the geologist, as well as the artist, may find a virgin field. Many of the peaks, lakes, glaciers and creeks are unnamed. Some of the more important summits, other than those mentioned, are the following: Mount Powell, Deer Lodge County, 12,000; Chief Mountain, 10,000; Mount Lo Lo, Bitter-Root range, 9,500; Saint Mary, Bitter-Root range, 9,500; Electric Peak, near the Park, 11,155; G. N., 10,000; Gallatin, 10,967. The greater portion of the State lies east of the Rockies. Most of this section may be classed with the Great Plains region, traversed as it is by the mighty Missouri and its tributaries. Part of this Great Plains portion of the State is high and rolling, eminently adapted for grazing; but a large portion is adapted to farming, when irrigated, and will supply farms and homes for thousands of families in the years to come.

River Systems.— The waters from the mountains of Montana are carried by different river systems to the three oceans, the Arctic, the Pacific, and the Atlantic through the Gulf of Mexico. In the western part the Bitter-Root River gathers the waters from the snow crests of the Bitter-Root range and from the spurs of the Rockies, and unites with the Missoula near the city of Missoula. The Missoula River through its various tributaries gathers the waters from a large portion of the western slope of the main range, including that which is used in the great smelters of Anaconda, and that which comes from the rich mines of Butte. Further north, the North Fork, Middle Fork, and South Fork of Flathead River, receive the drainage from the Mission and Swan ranges, the west slope of the main range, and a part of the Kootenais. These unite to form the Flathead River, which first pours its waters into the greatest reservoir of the State, Flathead Lake, and later joins the Missoula in the beautiful but narrow Paradise Valley to form Clarke's Fork of the Columbia. The Kootenai River

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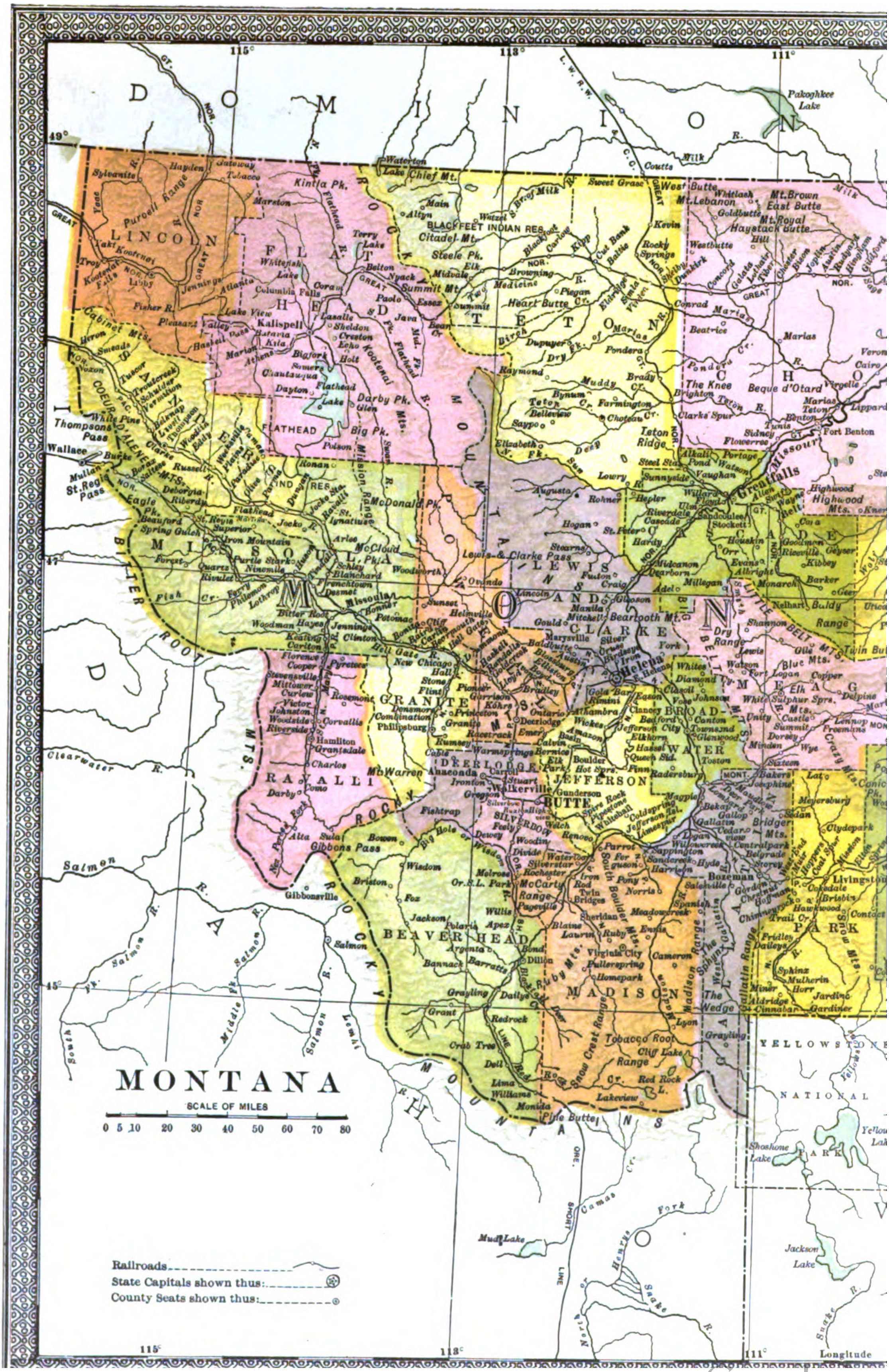
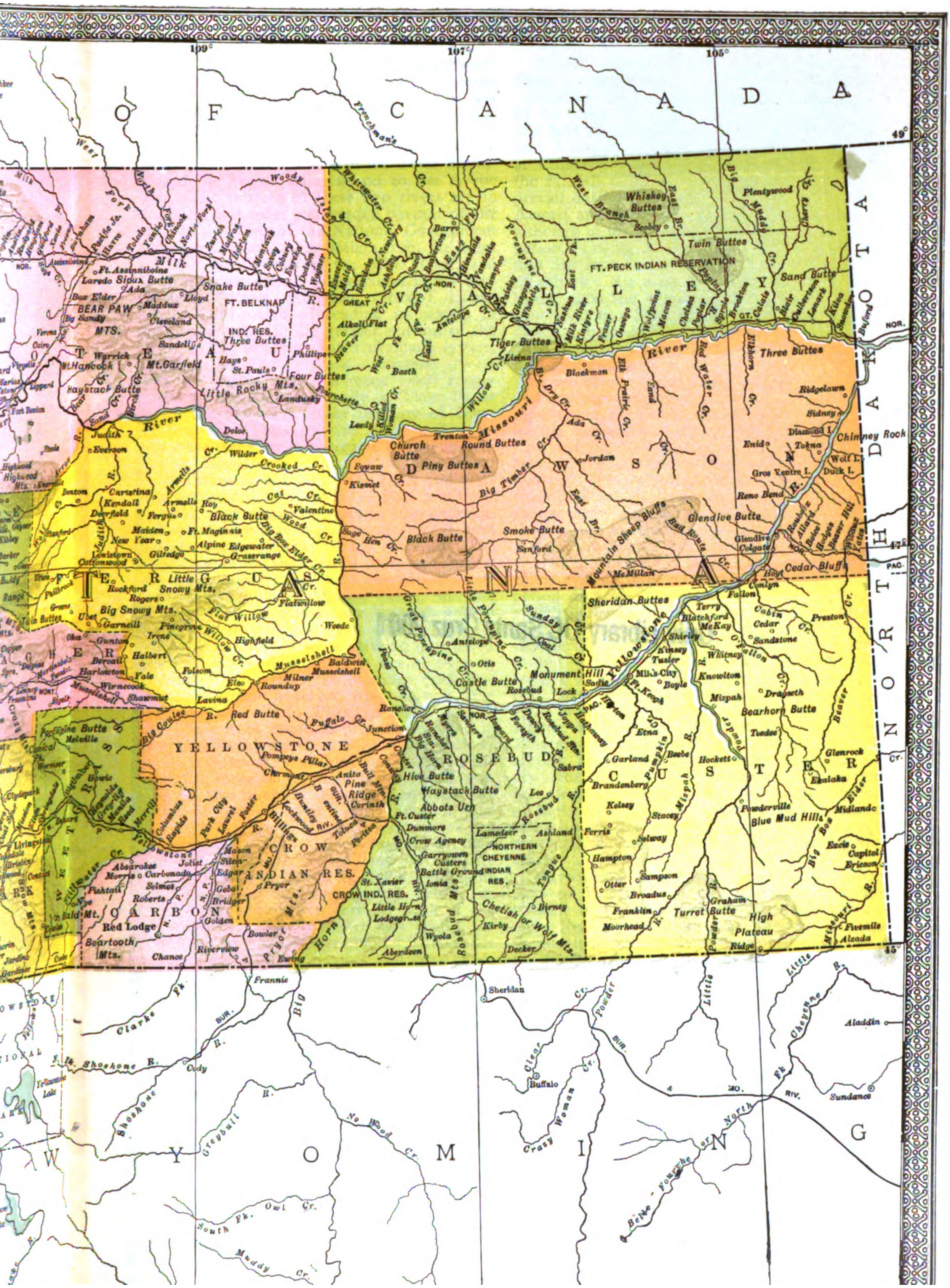


MONTANA

SCALE OF MILES
0 5 10 20 30 40 50 60 70 80
Railroads
State Capitals shown thus:
County Seats shown thus:
115°
113°
111°
49°
47°
45°
Longitude
DOMINION
IDAHO
YELLOWSTONE NATIONAL PARK
LINCOLN
FLATHEAD
TETON
CHOUTEAU
MISSOULA
LEWIS AND CLARKE
CASCADE
MEAGHER
GRANITE
RAVALLI
DEER LODGE
SILVER BOW
JEFFERSON
BROADWATER
BEAVER HEAD
MADISON
GALLATIN
PARK
MONTANA
ROCKY MOUNTAINS
BITTER ROOT
FLATHEAD IND. RES.
BLACKFEET INDIAN RES.
Helena
Butte
Great Falls
Missoula
Kalispell
Fort Benton
Bozeman
Livingston
Dillon
Virginia City
Anaconda
Hamilton
Philipsburg
Boulder
Townsend
Choteau
Libby
Lewis & Clarke Pass
Gibbons Pass
Thompsons Pass
St. Regis Pass
Flathead Lake
Pakoghkee Lake
Shoshone Lake
Yellowstone Lake
Jackson Lake
Mud Lake
Missouri
Milk R.
Marias R.
Sun R.
Clearwater R.
Salmon R.
Snake R.
Red Rock L.
Highwood Mts.
Crazy Mts.
Bridger Mts.
Big Belt Mts.
Little Belt Mts.
Ruby Mts.
Tobacco Root Range
Snow Crest Range
Madison Range
Gallatin Range
Cabinet Mts.
Coeur d'Alene Mts.
Purcell Range
Mission Range
Wallace
Salmon
Gibbonsville
Pine Butte
Coutts
Sweet Grass
Waterton Lake
Chief Mt.
Kintla Pk.
McDonald Pk.
Big Pk.
Darby Pk.
Bearooth Mt.
Silverbow


109°
107°
105°
49°
47°
45°
OF CANADA
DAKOTA
NORTH DAKOTA
WYOMING
VALLEY
DAWSON
CUSTER
ROSEBUD
YELLOWSTONE
CARBON
FERGUS
CHOTEAU
MEAGHER
PARK
Frenchman's
Whitewater Cr.
Whiskey Buttes
Plentywood
Scobey
Twin Buttes
FT. PECK INDIAN RESERVATION
Big Muddy
Poplar
Brockton
Sand Butte
Culbertson
Blair
Bainville
Buford
GREAT NOR.
Alkali Flat
Glasgow
Hinsdale
Saco
Malta
Wagner
Dodson
Harlem
Zurich
Chinook
Havre
Ft. Assinniboine
Laredo
Sioux Butte
Ada
Box Elder
BEAR PAW MTS.
Snake Butte
FT. BELKNAP IND. RES.
Three Buttes
Cleveland
Lloyd
Maddux
Big Sandy
Warrick
Ft. Hancock
Mt. Garfield
Haystack Butte
Hays
St. Pauls
Phillips
Four Buttes
Little Rocky Mts.
Landusky
Tiger Buttes
Listna
Milk R.
Beaver Cr.
Basth
Willow Cr.
Leedy
Killed Woman Cr.
Blackmon
Missouri River
Trenton
Round Buttes
Church Butte
Piny Buttes
Squaw
Kismet
Big Timber
Jordan
Dry Cr.
Ada
Elk Prairie Cr.
Red Water Cr.
Three Buttes
Ridgelawn
Sidney
Diamond I.
Chimney Rock
Enid
Tokna
Wolf I.
Duck I.
Gros Ventre I.
Reno Bend
Glendive Butte
Glendive
Colgate
Bad Route Cr.
Mountain Sheep Bluffs
Smoke Butte
Sanford
Black Butte
Sage Hen Cr.
McMillan
Cedar Bluffs
Hoyt
Conlyn
Fallon
Sheridan Buttes
Terry
Blatchford
McKay
Shirley
Kinsey
Tusler
Miles City
Ft. Keogh
Boyle
Whitney
Knowlton
Mispah
Dragseth
Bearhorn Butte
Toedes
Cabin Cr.
Cedar
Sandstone
O'Fallon
Preston
Beaver Cr.
Glenrock
Ekalaka
Hockett
Powder R.
Powderville
Blue Mud Hills
Midlando
Big Box Elder
Excis
Capitol
Ericson
High Plateau
Ridge
Turret Butte
Graham
Fivemile
Alzada
Little Missouri R.
Moorhead
Franklin
Broadus
Otter
Sampson
Selway
Hampton
Ferris
Stacey
Kelsey
Brandenberg
Garland
Pumpkin Cr.
Etna
Beebe
Yellowstone
Great Porcupine Cr.
Sunday Cr.
Antelope
Otis
Castle Butte
Rosebud
Lock
Monument Hill
Sadie
Hathaway
Joppa
Sabra
Forsyth
Howard
Haystack Butte
Hive Butte
Abbots Utn
Ft. Custer
Dunmore
Crow Agency
Garryowen
Custers Battle Ground
Ionia
Lamedeer
Ashland
NORTHERN CHEYENNE INDIAN RES.
Tongue R.
Chetish or Wolf Mts.
Birney
Kirby
Decker
Rosebud Mts.
Wyola
Aberdeen
Lodgegrass
Little Horn
St. Xavier
CROW IND. RES.
CROW INDIAN RES.
Pryor Mts.
Pryor
Big Horn
Ewing
Bowler
Riverview
Chance
Red Lodge
Beartooth Mts.
Roberts
Fishtail
Absarokee
Morris
Carbonado
Joliet
Edgar
Bridger
Golden
Billings
Laurel
Park City
Columbus
Rapids
Yellowstone
Pompeys Pillar
Clermont
Pine Ridge
Corinth
Custer
Junction
Ranchester
Red Butte
Lavina
Roundup
Musselshell
Baldwin
Milner
Shawmut
Harlowton
Wirnecook
Halbert
Yale
Folsom
Elso
Highfield
Flat Willow
Flatwillow
Weede
Big Snowy Mts.
Little Snowy Mts.
Rockford
Rogers
Garneill
Ubet
Gunton
Pinegrove
Irene
Lewistown
Cottonwood
Gilredge
Grassrange
Edgewater
Alpine
Ft. Maginnis
Maiden
New Year
Black Butte
Big Box Elder Cr.
Valentine
Wood
Fergus
Kendall
Deerfield
Armells
Cartstina
Denton
Everson
Judith
Roy
Wilder
Crooked Cr.
Deloe
River
Livingston
Melville
Big Timber
Bowie
Reynolds
Merrill
Porcupine Butte
Conical
Mt.
Clarke Fk.
Frannie
Sheridan
Cody
Shoshone R.
Greybull
No Wood Cr.
Owl Cr.
South Fk.
Muddy Cr.
Buffalo
Clear Cr.
Crazy Woman Cr.
Powder
Little Powder
Belle Fourche
North
Cheyenne
Aladdin
Sundance
BUR. & MO. RIV.
NOR. PAC.
Yellowstone Lake

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takes the drainage from the extreme northwestern corner, a part of the Columbia drainage system. The rivers on this western side are clear and swift, with rocky and picturesque cañons. The Belly and Saint Mary rivers in the northern part of the main range carry the ice cold water from the glaciers of the Chief Mountain and the region adjacent on to the Arctic Ocean. The sources of these two rivers are in the wildest and most picturesque portion of the State. If the plans of the National Government are executed, much of the waters from the Saint Mary will be diverted to the Milk River, and used in the vast system of irrigation under contemplation. Mount Stimpson (10,000) claims the proud distinction of sending its waters to three oceans. By far the greater portion of the State is in the Missouri River drainage system. The Madison, Gallatin and Jefferson rivers gather the waters from the many small ranges adjacent to the Park and unite at Three-Forks to form the Missouri. Near the city of Great Falls are the «Falls of the Missouri,» from which place the river is navigable to its juncture with the Mississippi. The Yellowstone River rises in Yellowstone Lake in the Park, and after taking its two mighty leaps in the Park and flowing through its magnificent gorge, it emerges as a restless river, continuing in swift descent until its waters merge with the muddy Missouri. The Yellowstone is the most rapid navigable stream in the world. From the north the Missouri receives the waters of the Marias, Teton, Sun and Milk rivers, all of which flow through valleys of great fertility. The scenery along the rivers is varied, and exhibits some striking antitheses. The valley of the Bitter-Root is one of remarkable beauty. The river, as it winds back and forth like a stream of silver, when viewed from Mount Lo Lo, Ward's Peak, or Saint Mary's in the Bitter-Root range, is probably equaled in quiet and peaceful grandeur only by the Yellowstone as it flows through Hayden Valley in the Park. The three branches of the Flathead present to the few travelers along their course many gorges and cañons. The South Fork in one place in the Lewis and Clarke forest reserve has cut its way through solid rock, making a cañon so narrow that pack horses may be and are forced to leap from brink to brink, while the river seethes and boils many feet below, its ominous roar announcing certain death if the leap is short. The Missouri has made the famous «Gateway of the Mountains,» its splendor first told by Lewis and Clarke, and later made famous by the brush of artists. At the city of Great Falls, it hastens its speed before tumbling over the beautiful Black Eagle falls, spanned by a bridge on the Great Northern railroad, and does not diminish its speed until the bottom of the Great Falls is reached. The valleys of these rivers and their smaller tributaries make rich farming soil, suitable for grain, vegetables, and fruit. The Bitter-Root Valley in the west was settled first, and is a great farming and fruit raising region. The country adjacent to Flathead Lake is thickly settled, and produces abundant harvests without irrigation. The Gallatin Valley has become famous for its bountiful harvests, and the Yellowstone is being largely used for agriculture and fruit. The northern tributaries of the Missouri, while watering very fertile valleys, are in a thinly settled region.

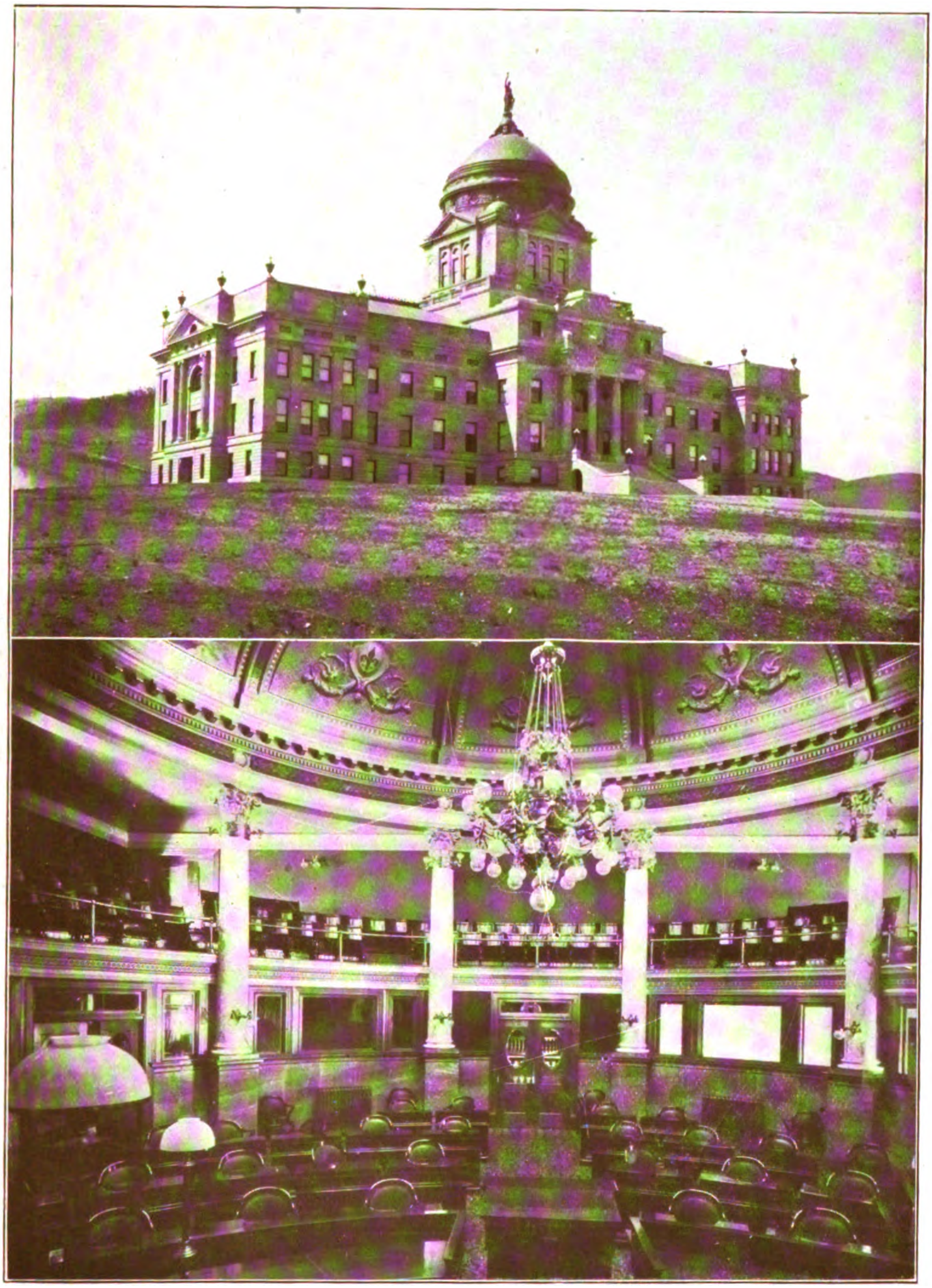
Climate and Rainfall.— The climate of the State is exceedingly varied, and is much more salubrious than is generally supposed. West of the range the winters are mild, the summers and falls are delightful. The rainfall at Missoula and Kalispell averages about 16 inches, while at Culbertson and Glendive in the eastern end the rainfall is about 13 inches. Rain and snow prevail during the spring until early July. July, August and September are largely without rain, although in many places there is no need of irrigation. Owing to the different altitudes, snow may fall later in the spring at some places than at others. An area of 40,700 square miles is below 3,000 feet elevation above the sea; this is equivalent to a State the size of Georgia. About 10,200 square miles exceed 8,000 feet altitude. The climate on the Pacific slope is milder and less changeable than that of the Atlantic side. The majority of the areas of high barometer, and accompanying cold, originate in the Arctic region, and are deflected southward or eastward by the Rocky Mountains. While eastern Montana and the Dakotas may be in the throes of a blizzard the western end may be enjoying balmy weather. The coldest weather at Missoula for 7 years is — 22° F., while during some winters the thermometer does not go below zero. The mean temperature in the western end is 44° F. At Helena, altitude 4,500, the mean maximum is 43.1. Chinook winds may occur over the entire State, melting large quantities of snow in a short period of time. Owing to the usual absence of a high percentage of humidity, the cold weather is not extremely disagreeable, nor the warm days smotheringly oppressive. The hot days may blister the skin, while the nights following will be cool enough to require blankets. Rarely does one sleep without considerable covering, and some people wear the same clothing summer and winter, donning extra coats or wraps in winter. This may be given as the general summary: the springs are rainy; the summers are clear and dry; the autumns are delightful; the winters are clear and bracing. Owing to the absence of high humidity the climate is very beneficial to health, as statistics will show. It is especially beneficial to those affected with pulmonary diseases.

Agriculture and Husbandry.— In the early days of Montana's history it was not thought possible to grow crops in the State to much extent. Nearly everything was shipped in from the outside. As the mines developed the demand for food became so great as to stimulate agriculture, and fruit raising was also attempted. Marked success attended the efforts, and large acreage of grain and orchards were put out annually, until agriculture and husbandry have developed into important economical features in the State's progress, and bid fair to rank close to the mineral wealth in the near future. In 1902, nearly 250,000 fruit trees were set out; the number was almost doubled the succeeding year. At the close of the year 1903, nearly 1,500,000 fruit trees had been set out in various parts of the State. The harvest in that year was 250,000 bushels of apples. The trees in the orchard include apples, cherries, plums, apricots and peaches. Small fruit, such as gooseberries, strawberries, blackberries, currants, and the like, produce enormous crops from small acreage, while to describe the size and weight of the fruit is almost beyond belief. Apples are shipped to the eastern States and even to England. As they are remarkably free from insect pests, owing to the stringent legislation and watchful care in orchard inspection, home-grown apples are always in demand, the demand being far in excess of the supply. As a small part of the total number of trees bore fruit at the beginning of 1904, the insufficient supply is accounted for, but the crop of the orchards will increase in amount very rapidly. The Bitter-Root Valley, in the western part of the State on the Pacific slope, is the oldest orchard section, and is fast becoming famous as a fruit growing valley. But the orchards are not confined to this beautiful and fertile valley. The valley to the north of Flathead Lake is filled with orchards already breaking beneath their loads of fruit. The Yellowstone Valley is developing rapidly as a fruit-growing region, even growing grapes. The most recent observations show that fruit trees may be grown and that apples will mature in every portion of the State, and apples are now grown in every county of the State with but a few exceptions. Horticulturists insist that fruit trees may be grown in every county of the State. Since the portion of the State east of the Rocky Mountains is much greater than on the west the fruit growing possibilities of the State may be readily understood when it is known that the great majority of the fruit trees of the State are on the Pacific side. The total value of farm lands in 1910 was $225,819,000, an increase of 394 per cent in ten years; that of farms, including farm improvements and buildings, $250,485,000, an increase of 355 per cent in ten years; that of implements and machinery. $10,522,000, or 187 per cent; and that of live stock, about $40,000,000, also a large increase. The value of farm products has steadily increased year by year. Of the total land area of the State 11,844,454 acres, or 12.7 per cent, were included in farms in 1900. The average size of the farms was 885.9 acres, of which 14.7 per cent was improved land. The total number of farms was 13,370, an increase of nearly 250 per cent in the decade. The total acreage in farms in 1900 was almost 85 times that reported in 1870. Eastern Montana contains more than three fifths of the total area of the State. In the extreme eastern part are the «Bad Lands,» a continuation of the «Bad Lands» of the Dakotas, Wyoming and Nebraska, practically non-irrigable because of the uneven surface. The Yellowstone Valley has become famous for its growth of alfalfa. Two or three cuttings, a total of 4 to 7 tons per acre, are had. The Gallatin, Madison and Jefferson valleys in the southeast produce rich harvests of cereals, never failing through irrigation. In the west the Bitter-Root, Missoula and Flathead valleys, while less extensive, produce as abundant harvests, often without irrigation. The lands are of three general classes — the bottom lands, near the streams, with rich, black, alluvial soil; the bench lands, whose soil is a sandy loam, capable of wide range of cultivation; and the high bluffs, suitable largely for grazing. Experiments in «dry land farming,» farming on the uplands without irrigation, in 1903, indicate that good crops may be grown in this way, and the method is encouraged by the experiment station; 90.8 per cent of the farms are operated by the owners thereof. The entire Crow Indian reservation is included in the statistics as one farm, thus making the average size quite large. Nearly 300 farms were operated by Indians, 26 by Chinese and 21 by negroes. This was about 0.4 per cent of the total farm acreage. The government plans for irrigation will reclaim large tracts of land and put it under cultivation. The crops raised are corn (280,103 bushels); wheat (6,251,945 bushels); oats (13,805,735 bushels); barley (753,268 bushels); rye (111,194 bushels); hay and forage (1,693,556 tons); dry peas (21,670 bushels); potatoes (3,240,696 bushels), in 1909, other crops in small quantity, making a total valuation of $40,0000,000. During the past few years, many small fruit and truck farms have been started, promising greater returns per acre and greater variety of farm products, as ready market awaits all kinds of farm products. Montana leads the Union in the number of sheep, there being more than 5,500,000 in 1910. The sheep industry has proven profitable in the eastern portion where there is much open range. Few herds are to be found west of the range. The fleeces weighed 35,500,000 pounds, valued at over $6,000,000. In 1910, there were 925,000 of cattle and 319,000 of horses, the assessed valuation of the former being about $3,700,000, and of the latter $6,061,000.

Timber and Lumber.— Twenty-nine per cent of the total area of the State is covered with timber, which is 8 per cent less than for the average of the entire United States. The timber growth is largely of coniferous trees, yellow pine, tamarack, and Douglas spruce, comprising the most of the commercial product. Along the streams occur forests of cottonwood. In the drier portions of the State, stunted red cedars often grow along the smaller water courses, of great value to settlers, as they supply posts and wood. Forests of white cedar or arbor-vitæ, white pine, and Engelmann's spruce occur in the western part. On the higher slopes and summits the alpine species thrive; but as they are limbed to the base of the tree and inaccessible, they are not of value commercially. They are useful in preventing the rapid melting of the snow in the spring, holding it until later in the season when it is needed in irrigation. A considerable portion of the State's timbered area is included in government forest reserves. On the west the Bitter-Root reserve includes a portion of the Bitter-Root range within the State, and since the higher summits are not in the watershed of the range, but far to the east of it, the reserve includes territory from which comes the water to irrigate the fertile Bitter-Root Valley. In the north is the Lewis and Clarke reserve, formed by the union of the original Lewis and Clarke reserve, the Flathead reserve, and a narrow strip along the Great Northern railroad which was originally not included in either. In the southeastern part is the Gallatin reserve. In 1902, the same year in which the proclamation was made for the Gallatin reserve, proclamations were issued setting aside the Little Belt Mountain reserve, the Madison and the Absaroka reserves. The area embraced in each is as follows:

1. Lewis and Clarke, 6,732 square miles, or 4,308,480 acres, not including the narrow strip along the Great Northern Railway.
2. The Bitter Root, 6,480 square miles, 450,000 acres of which are in Montana, the remainder in Idaho.
3. The Gallatin, 63 square miles, or 40,320 acres.

MONTANA.



CAPITOL AND SENATE CHAMBER, AT HELENA.

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4. The Little Belt, 503,040 acres, including the town of Neihart and the Yogo sapphire mines.
5. The Madison, 800,000 acres.
6. The Absaroka, 1,385,600 acres.

The total of all land in government forest reserves in the State in 1902 was 7,487,400 acres, nearly 11,700 square miles, or about one thirteenth of the total land area of the State. The lumber output of 1909 was 250,000,000 feet, valued at $3,750,000. The United States Geological Survey in 1902 estimated all of the merchantable timber on all of the reserves in the State at 14,974,800,000 feet. On State land there was estimated to be 912,000,000 feet, making the total estimate of merchantable timber on State or government lands 15,886,800,000 feet. This estimate does not include timber in the Northern Pacific land grant, nor on the land belonging to private owners and milling companies. At the 1902 rate of consumption, the timber on the State and government lands will satisfy the mills for 60 years. The cut in 1910 from national forests was 87,598,000 feet.

Mines and Mining.— Montana has been known principally on account of her mines, and leads in the production of copper and in the output of sapphires. The early history of the State is the search for gold, and many of her towns and cities are built in gulches where placer gold was mined. Virginia City and Helena are illustrations, the former being the oldest camp in the State. Although Butte is the greatest mining camp in the State, and indeed the greatest in the world, it is by no means the only place where mining is carried on. In 1900, mining for gold and silver was carried on in the following counties: Beaverhead, Broadwater, Cascade, Choteau, Custer, Deer Lodge, Fergus, Flathead, Granite, Jefferson, Lewis and Clarke, Madison, Meacher, Missoula, Park, Ravalli and Silver Bow. Lewis and Clarke was the greatest producer with 70,000 fine ounces of gold and 172,531 fine ounces of silver. The total product of gold and silver in the State in 1900 was 229,114 ounces of the former and 14,294,835 of the latter. In 1909 there were 181,411 ounces of gold and 12,034,500 ounces of silver. During the 40 years following the discovery of gold in the State over $1,000,000,000 in value of gold, silver, copper and lead have been taken from the streams and mountains of the State. While Butte is *the* mining camp for copper, it is also mined in the counties of Beaverhead, Granite, Jefferson, Lewis and Clarke, Madison and Meagher. Butte, in Silver Bow County, produced 210,000,000 pounds of the total of 313,838,000 pounds from the State in 1909. Lead was produced in all the counties mentioned except Madison, and in addition also in Broadwater, Cascade and Flathead. The total lead output in 1901 was more than 11,500,000 pounds, and in 1902 it was nearly 16,000,000. Montana is one of the richest coal States in the West, although much of it is undeveloped. Over 1,810,000 tons were mined in 1910, and new mines are being opened annually. The cretaceous, bituminous and semi-bituminous coal areas in the State cover about 13,000 square miles, and the lignite area about 25,000. Not all of this territory contains coal, of course, but the deposits are found quite abundantly throughout the territory. The tests show the bituminous coal to be but little inferior to Pennsylvania bituminous coals. Bituminous coal or lignite has been found in every county of the State except Jefferson. The undeveloped coal industry will without doubt be a prominent factor in the future expansion of other industries of the State. In addition to its coal, the State has extensive beds of clay; the brick and clay product in 1909 amounted to $451,389. The output of building stone was about the same. Montana leads the Union in the production of sapphires, the actual mining of which began in 1891. Four mining regions may be mentioned: A belt 12 miles northeast of Helena on the Missouri River; the Rock creek region, 30 miles west of Anaconda; the Cottonwood creek field, 10 miles east of Deer Lodge, and the Yogo mines in Fergus County, 13 miles west of Utica.

Coal Mines Accident Insurance Law.—All workmen, laborers and employes of coal mines are insured against accidents occurring in the course of their occupation. In the event of death $3,000 will be paid in the following order: (1) to surviving wife and child or children; (2) to surviving parents who are dependent or partially so upon the deceased; (3) if none, then to such other relative as may be dependent. Where the workman is incapacitated, he shall be compensated at rate of $1 a day for each working day. Total or permanent disability shall consist of the loss of both legs or arms, the total loss of eyesight or paralysis. Loss of any limb or eye shall be compensated in the sum of $1,000. For the creation of this accident fund, the employers are taxed one cent per ton on the coal mined and the employees one per cent of their gross monthly wages.

Manufactures.— The predominating industry is the smelting of ores. The largest smelter in the world, the Washoe, is located at Anaconda. For the treatment of ores, water is brought from a lake some fifteen miles away in the mountains. The smelters of Butte have long been known. At Helena a large smelter is in operation, and another at Great Falls, where water power from the Missouri River is used. Many flouring mills have been established, utilizing almost the entire crop of wheat in the State, and consuming large quantities from the Dakotas. The large lumber mills at Bonner, Hamilton, Somers and other places have extensive factories in connection with the saw mills. They manufacture doors, sash, blinds, and other finishing stuffs. They also make large quantities of furniture from native lumber. A woolen mill, in operation in Big Timber, established in 1901, consumes a considerable amount of wool product. Although Montana leads all other States in the number of sheep, the loss from the two items of freight eastward and the difference in the value of the wool in the grease and the scoured product would annihilate the value of all the flocks on the range of the State in a very few years, if the wool is all shipped to the east. To treat it in the State saves $1,000,000 annually to the State. Nearly every large town has a factory for malt liquors. Creameries and butter factories are springing up. The transcontinental railways have several repair shops and round houses in the State.

Railroads.— The total mileage of railroads in 1909 was 3,818.16 and the mileage of their side tracks 1,130.69. The valuation of the main line was fixed at $56,570,091 and that of the side tracks $1,852,758, making a total of $58,422,849. Two transcontinental lines cross the State. In the north is the Great Northern, with its many branch lines. Toward the southern part is the Northern Pacific, also with numerous short branches as feeders. The Burlington connects with the latter at Billings, running through trains over the Northern Pacific tracks to the coast. The Northern Pacific operates three daily passenger trains each way over most of the State — as far east as Billings, where one takes the Burlington route for Denver, Omaha and Saint Louis. The Great Northern operates two daily passenger trains each way over its road. The Oregon Short line connects at Butte, making a gateway to Salt Lake and the south, east and west. From one end of the State to the other on the Northern Pacific requires about 24 hours of travel, following for considerable distances the Missoula, Missouri, Gallatin and Yellowstone rivers, with their varied scenery. The Great Northern skirts the banks of the Kootenai, the Flathead, the Milk, and the Missouri rivers, and gives a view of the great unoccupied field along the two latter. Under the new law railroads are liable for injuries caused by fellow-servants and in the event of death, the heirs and personal representatives may prosecute the action.

Finances.— The total assessed valuation of all property in the State in 1910 was $309,673,699. The constitution of the State prohibits an indebtedness exceeding $100,000. The tax rate was less than $2.50 per $1,000.

State Government.— The constitutional convention met at Helena 4 July 1889, and concluded its labors 19 August. The constitution was approved by the people at a special election in October, and the proclamation making Montana a State was issued 8 November. Women are eligible to vote at all school elections, or to hold office or to be employed in any capacity in the State's educational system, except the office of State superintendent of public instruction. In 1902 women filled the office of county superintendent in 25 out of the 26 counties. They are frequently elected on school boards. The governor and State officers hold office four years, elected by a plurality vote. The governor is a member of the State board of prison commissioners, State board of examiners, State board of land commissioners, State board of equalization, State board of education, State board of commissioners for the insane, State board of commissioners for the deaf, dumb and blind, State board of horticulture, farmers' institute board, and State board of livestock commissioners. He appoints the State land agent, boiler inspector, mine inspector, medical and dental examiners, register of the land office, veterinary surgeon, trustees of the soldiers' home and State orphans' home, the State board of education, commissioner of agriculture, labor and industry, board of charities and reform, and board of pharmacy. The legislature has biennial sessions, the senate being composed of one member from each county, the house of representatives of such apportionment as is made by the legislature by law. There are now 26 in the Senate, 4 years, one half holding over, and 72 in the House, two years, making the total legislative assembly 98. The State has one representative in Congress. There are three judges of the State supreme court, for a term of six years. There are twelve judicial districts, the judges elected for four years. The term of county commissioners is four years, each county having three members.

Banks.— Montana has 40 national banks, 40 State banks, 3 savings banks, and 8 private banks. The total savings deposits in 1909 were $8,544,203.03. The deposits of the national and State banks for 1910 were $57,974,805.19 and the capital, surplus and undivided profits $16,932,575.49.

Education.—Although young among the States, Montana ranks high in the efficiency of her educational system, the illiteracy of native born population being less than 4 per cent. Salaries of teachers are the highest of any State in the Union. More than 25 cents per day is spent upon each child in school, which is exceeded by two other States. There are school lands amounting to 2,341,000 acres, and land grants to State institutions aggregating 668,080 acres. There are about 1,200 teachers in the State, and 21 high schools are on the accredited list of the State University. The State has a system of county high schools, under a separate board of trustees and with separate administration from city schools. These schools are maintained by county assessment, and are free to pupils in the county. The law was passed in 1898, and has borne fruit beyond the expectations of the promoters of the law. More than half of the counties in the State have county high schools. For these schools, expensive and lasting buildings are constructed, which are being erected rapidly. This system gives to the counties in which the schools are located a number of specialists as teachers, which must result in great good to the educational system. The State Normal School, at Dillon, has about 100 in attendance, although organized but a few years. The land grant, 100,000 acres, is selected, yielding an annual income of over $5,000, which is constantly increasing. The State Agricultural College and experiment station at Bozeman (1892) has about 421 students. The land grant is 140,000 acres. The State School of Mines (1899) is at Butte, with about 100 students; land grant 100,000 acres. The State University (1895), at Missoula, has about 175 students; land grant 46,080 acres. The University established a summer school for science at the upper end of Flathead Lake in 1899, known as the University of Montana Biological Station. It has continued in successful operation since, and has drawn many from the State and from eastern States. The Montana Wesleyan University (Methodist), at Helena, originally a college, was reduced to the rank of an academy in 1901, and later was made a college; 168 students (1910). The College of Montana (Presbyterian) was for years the only institution for higher education in the State. Financial difficulties caused its suspension about 1898. Many private schools are maintained by the Catholic Church. The Sacred Heart Academy at Missoula has an attendance of several hundred, as have also the academies in Butte and other places.

Charitable and Penal Institutions.— The penitentiary is located at Deer Lodge. The contract system is in vogue, the contract for the care of convicts being made by the legislature. Of the inmates, a small proportion are native born, the remainder of the convicts being from other States. Charities and reform are placed in the hands of a board of three members, appointed by the governor for four years. The reform school is located at Miles City. The school for deaf, dumb and blind is at Boulder, and is controlled by the State board of education. The Soldiers' Home is at Columbia Falls. The retreat for the Insane is at Warm Springs. In this, as in the penitentiary, the care of the inmates is by contract.

Government Reservations.— Notwithstanding the large area of the State a large part of it is set apart by Act of Congress as reserves. The forest reserves, with about 7,500,000 acres, are mentioned elsewhere. The Northern Pacific Railway Company received a grant from Congress approximating 15,000,000 acres. A part of this has been sold to settlers. There are several large Indian reservations in the State. The largest of these, the Crow reservation, occupies nearly half of Yellowstone County, while half of the reservation is in Custer County. It covers an area of 5,475 square miles, much larger than the State of Connecticut. Adjoining this on the east is the North Cheyenne reservation, with 765 square miles. In the northeastern part, with its southern boundary the Missouri River, is the Fort Peck reservation, comprising 2,775 square miles. In Choteau County the Fort Belknap reserve covers 840 square miles. The Blackfeet reserve covers about a third of Teton County. The only Indian reserve west of the divide in the State is the Flathead reservation, covering 2,240 square miles. The total land comprised by Indian reservations is about 7,500,000 acres, or equal to all the forest reserves. There are 300,000 acres in Military reservations. The State lands aggregate 3,000,000 acres. This leaves less than 60,000,000 acres as public lands, or held by settlers or mining claimants.

History.— The name Montana signifies mountains. The first explorations are believed to have been made by Verendrye, a French explorer, who, with his brother, two Canadians and a large war party of Sioux, ascended the Missouri River to the Gateway of the Mountains in 1745. They appear to have remained in Montana and Wyoming for about a year. The leaden plate bearing the arms of France, which they claimed to have buried beneath a monument, has not been discovered. It is supposed to be near the Great Falls of the Missouri. For 50 years the country remained unknown to history. The whole territory was ceded to Spain by France along with Louisiana in 1764. In 1800 the country again passed to France by treaty. In 1803 the Louisiana grant, embracing a large part of what is now Montana, was ceded by France to the United States for a consideration of $15,000,000. The portion of the State west of the Rocky Mountains was embraced in the Territory of Oregon, when Oregon was organized in 1848. In 1863 a new Territory of Idaho was formed, including Montana. In 1864 the Territory of Montana was organized, with its boundary the same as that the State now has, except that about 2,000 square miles have been added in the southeast. In 1804 President Jefferson sent an expedition to explore the northwestern territory. The expedition was under the direction of two army captains, Lewis and Clarke, and has become famous in history as the Lewis and Clarke Expedition (q.v.). They ascended the Missouri, explored some of its tributaries, crossed the range to the Pacific Ocean, and returned in safety to Saint Louis. The first trading post was that of Manuel Lisa, built in 1807 near the mouth of the Big Horn, on the Yellowstone. In 1827 another was established on the Missouri at the mouth of the Milk River. In 1829 Alexander Mackenzie, for the American Fur Trader Company, built Fort Union on the Missouri above the mouth of the Yellowstone. In 1832 the steamboat Yellowstone ascended to this point. Previous to this all supplies were taken overland, a distance of nearly 2,000 miles. In 1835 a steamboat went 60 miles up the Yellowstone. In 1846 Fort Benton was built. Steamboats ascended the Missouri to the Fort in 1860, and the property was turned over to the United States in 1869. On the western side Father De Smet established St. Mary's Mission at Stevensville in 1845, still standing in 1904. Later he founded Saint Ignatius Mission in the valley at the foot of Flathead Lake and in the shadow of the beautiful Mission Mountains, which for 50 years was a great power for good among the Indians. From 1840 to about 1860 the history of Montana is occupied mainly with the missionary labors of Father De Smet and his associates among the Flathead Indians. About 1855 there were rumors of gold. In 1852 a half-breed named François Finlay, in Indian Benetzee, found gold in the sands of Gold Creek in Deer Lodge County. Rich discoveries were found in 1861. In 1862 Grasshopper and White's Bar were discovered, and Bannack in January 1863. Gold dust to the amount of $25,000,000 was taken from Alder Gulch in a few months. Last Chance Gulch, where Helena now stands, produced many fortunes. The early mining was largely from placers, but the introduction of machinery made the treatment of ores of silver, gold, and copper very productive, and made the permanent prosperity of Butte. The introduction of so many settlers was not without a struggle. The Indians resisted the advance of the white men. Many minor conflicts occurred, but two are worthy of special mention. The war with the Sioux opened in 1876, and was a desperate conflict. General Custer was despatched against the Sioux, under the leadership of Sitting Bull, numbering 6,000 warriors. Pushing up the Rosebud to its headwaters Custer found the Indians encamped on the Little Big Horn. Custer was surrounded and his entire command massacred, not a man escaping. Within a year a series of victories under General Miles had destroyed the power of the Indians. In 1877 Chief Joseph, of the Nez Perces in the western part of Idaho, and his tribe prepared to cross the Bitter-Root Mountains against the orders of the government. They crossed the mountains and passed up the Bitter-Root, pursued by soldiers under the command of General Gibbons. At the Big Horn a bloody and indecisive battle was fought. Chief Joseph passed through, up the Madison, through the National Park, across the prairie to Snake Creek, and was captured only a few miles from the Bear Paw Mountains,— a trail of over 1,500 miles, more than half of which was a running battle. A convention met in Helena in January 1884, which adopted a State constitution. This was approved by the people in November of the same year. Congress refused to sanction the request for statehood, and this was not granted until 1889. During the past ten years immigration has brought many citizens from other States. The former restless population has changed into people who are desirous of making permanent homes. Agriculture and fruit culture, through irrigation, has added a new industry to the State, and the people of the farm join hands with the toiler beneath the surface in the mines in an exchange of products, to the advantage of both and for the material advancement of the State.

Population.—The first territorial census in 1860 shows but 288 people in the Territory, exclusive of Indians. The population as given by the census for each decade is as follows: (1860) 288; (1870) 20,595; (1880) 39,159; (1890) 132,159; (1900) 243,329. The population at the last census was 376,053 (including Indians, Chinese, and Japanese), an increase of 54.5 per cent. The total population of school age was 65,871. The aggregate for the State militia was 83,574. But 5.8 per cent of the population was considered illiterate, the native born having but 3.9 per cent as against 8.3 per cent foreign born, and native Indians.

There are 28 counties in the State, as follows, with their county-seats:

Beaverhead, Dillon.
Broadwater, Townsend.
Carbon, Red Lodge.
Cascade, Great Falls.
Choteau, Fort Benton.
Custer, Miles City.
Dawson, Glendive.
Deer Lodge, Anaconda.
Fergus, Lewistown.
Flathead, Kalispel.
Gallatin, Bozeman.
Granite, Phillipsburg.
Jefferson, Boulder.
Lewis and Clarke, Helena.
Lincoln, Libby.
Madison, Virginia City.
Meagher, White Sulphur Springs.
Missoula, Missoula.
Park, Livingston.
Powell, Deer Lodge.
Ravalli, Hamilton.
Rosebud, Forsythe.
Sanders, Thompson.
Silver Bow, Butte.
Sweet Grass, Big Timber.
Teton, Choteau.
Valley, Glasgow.
Yellowstone, Billings.

The cities in the order as given by the census of 1910, are as follows: Butte, Great Falls, Helena, Anaconda, Missoula. Butte is easily ahead of all other cities in population and business. Its great mines and smelters, working day and night, create a never ceasing movement of the inhabitants. The city is located on the Pacific side of the main range, at an altitude of about 5,700 feet, a few miles from the summit of the range. Great Falls is in the prairie region, on the Missouri River, near the head-waters of the rapids and falls. The census population in 1910 does not indicate any growth of the city. The city has many boulevarded streets and takes on a metropolitan appearance. Helena, the capital, has an altitude of 4,710 feet. Its climate is remarkably good. The capitol, erected in 1900–2, at a cost of over half a million, is a beautiful structure, comparing favorably with similar buildings in other States costing much more for erection. Anaconda was founded by Marcus Daly as a suitable place for the erection of smelter works. Missoula, the Garden City, at the outlet of Hell Gate cañon to the Bitter-Root and Missoula valleys, commands the trade of the greater portion of the State west of the range. Hamilton, in the Bitter-Root Valley, has a beautiful and picturesque location. Near the town is the Daly ranch, reclaimed from the arid bench land of the valley, which was made self-supporting in a short time, and which has become famous for its stables of fleet horses. Bozeman, the beautiful city, is in the Gallatin Valley, on the historic ground discovered by the Lewis and Clarke expedition. Kalispell is in the rich valley at the head of the Flathead Lake, and in a few years grew into a good town. Miles City and Billings, in the east, both on the Yellowstone River, are centres of the great live stock region, and handle the trade of a large area of country. Small towns of the State do a surprisingly large business, commanding as they do all the trade for many miles.

Bibliography.— The following works may be consulted for further information relative to the history and development of the State: Bancroft, 'History of the Northwest Coast' (1886); 'Idaho and Montana' (1890); Biddle, 'History of the Expedition under the Command of Lewis and Clarke' (1842); Davies, 'Civics of Montana' (1896); Lewis and Clarke, 'Travels from St. Louis by Way of Missouri and Columbia Rivers to the Pacific Ocean' (1804–6); Palladino, 'Indians and Whites in the Northwest; or, a History of Catholicity in Montana' (1895); Roosevelt, 'Ranch Life and the Hunting Trail' (1888); 'Geological Survey of the Territory'; 'Preliminary Report of Montana and portions of Adjacent Territories' (1871); 'Wonderland,' issued annually by N. P. Railway, St. Paul; 'Rocky Mountain Magazine.' Publications from the agricultural experiment station at Bozeman, from the University at Missoula, and by the various State officers. Annual report, Bureau of Agriculture, Labor and Industry, Helena.

MORTON J. ELROD,
University of Montana.

Montana College of Agriculture and Mechanic Arts, founded in 1893, at Bozeman, Mont. The four years' undergraduate courses include general science, agriculture, biology, analytical and applied chemistry, domestic science, mechanical engineering, electrical engineering, and civil engineering; there are also short courses in business (one year), domestic science (one year), and agriculture (13 weeks). The degrees conferred for the regular undergraduate work are bachelor of science, bachelor of mechanical engineering, bachelor of electrical engineering and bachelor of civil engineering. Graduate courses are offered, and special courses in music and art; and a preparatory department is maintained. The State experiment station is also connected with the college. The college receives the benefit of the Federal land grants of 1862 and 1890, and also State and Federal appropriations; the annual income amounts to about $57,000. The students number 300, of whom about half are women.

Montana, University of, the State university opened in 1895, at Missoula, Mont. It was endowed by a grant of land from Congress in 1892. Courses are offered in the classics, philosophy, general science, and applied science; there is also provision for graduate work in these courses; a preparatory department is maintained, and there is a summer school of science. The degrees conferred are A.B. and B.S., and the corresponding masters' degrees. Women are admitted to the university, and constitute about one half the student body. The income is derived mainly from the proceeds of the sale or rental of the land given by Congress; State appropriations are also made; in 1910 the income amounted to $76,000. The campus contains 40 acres, and the buildings were valued at $140,000 in 1910; the number of volumes in the library was 7,500. In 1910 the students in all departments numbered 200, the faculty 24.

Montanism, mon′-, the religious system of Montanus (q.v.), an inhabitant of a Phrygian village called Pepuza, who, about 171 A.D., proclaimed himself the Paraclete or Comforter promised by Jesus, and he was professed to utter prophecies. Among others he was supported by two ladies, Prisca, or Priscilla, and Maximilla, who also claimed the gift of prophecy. He multiplied fasts, forbade second marriages, did not permit churches to give absolution to those who had fallen into great sin, forbade all female ornaments, required virgins to be veiled, and would not sanction flight in persecution. He was ultimately expelled from the Church. Tertullian, in the year 204, joined the Montanists, but did not forfeit the respect of the Church catholic, as the Montanists held the fundamental doctrine of Christianity, and differed from others more in their rigid practice than in their faith. Jerome wrote against the Montanists, who continued till about the 6th century.

Montanite, a mineral consisting of the hydrated oxids of bismuth and tellurium, and having the formula $Bi_2O_3.TeO_3.2H_2O$. It occurs as an incrustation, frequently in connection with the mineral teradymite, from which it is often formed by alteration. It is soft and opaque with a waxy lustre, and is variable in color. Montanite is found at Highland, Mont., and also in Davidson County, N. C., and at Norongo, N. S. W.

Montanus, mŏn-tā′nŭs, Phrygian sectary of the middle of the 2d century A.D. Of him practically nothing is known save in connection with his sect, the Montanists. He was a heathen priest, a native of Ardahan; was converted to Christianity about 156; and soon gathered around him a group of followers who believed with him that he was the mouthpiece of the Holy Spirit, as were his companions Prisca, or Priscilla, and Maximilla, each of whom had left her husband to join Montanus. Both these women uttered prophecies, but like Montanus claimed to be only the passive agents of the Holy Ghost. Montanus' principal tenets, apart from his belief that every believer may be the means of special revelation, were largely millenarian; in view of the approaching end of the world he enjoined asceticism, strict church discipline with the exclusion of all offending members, the terrible effect of mortal sin and the incompetency of the Church to forgive it. He and his followers counted it sin to attempt escape from persecution. He was excommunicated with his followers about 175, and died soon after; Maximilla, the last of the prophets, died in 179. His teaching spread after his death, his most notable disciple being Tertullian (q.v.). The sect soon died out in the West, but survived in the East until the time of Justinian, when it was suppressed. Consult Bonwetsch, 'Geschichte des Montanismus' (1881).

Montargis, môṅ-tär-zhē, France, a town in the department of Loiret, 47 miles east by north of Orleans. Here in 1371 is said to have occurred the famous judicial combat between the "dog of Montargis" and Macaire, its master's murderer. The dog not only showed the spot in the forest of Bondy where its dead master was buried, but singled out the murderer, and when Charles VI. granted the ordeal of battle to test his guilt, the dog flew at his throat and so proved its charge upon his body.

Montauban, môṅ-tō-bŏṅ, France, capital of the department of Tarn and Garonne, on the Tarn, 342 miles south by west of Paris. It is situated on a pleateau surrounded by the Tarn, the Tescou, and a deep ravine. The cathedral, episcopal palace, hôtel de ville, and the bridge over the Tarn are its principal features. Montauban has manufactures of silk bolting cloths, of common cloths, colors, porcelain, starch, candles, etc.; silk and wool spinning-mills, dye-works, potteries, etc. During the religious wars in France, Montauban was a stronghold of the Huguenots, and was besieged in 1580 by Montluc, and in 1621 by the troops of Louis XIII., without success; but it was taken in 1629 by Richelieu, and its walls razed to the ground. The Protestants still maintain both an academy and a theological college.

Montauk (mŏn-tâk′) **Indians,** an American tribe of the Algonquin family formerly occupying the extreme eastern end of Long Island, N. Y. They were formerly a powerful people, but a pestilence in the 17th century reduced their number to less than 1,000. In 1903 only about a dozen of the Montauk tribe survived.

Montauk Point, N. Y., the eastern peninsular promontory of Long Island, in Suffolk County, with lighthouse and life-saving stations, the lighthouse, in lon. 41° 4′ N.; lat. 71° 51′ W., being built of stone, 170 feet high, and its light visible 19 miles. The peninsula has a height of from 50 to 100 feet above the sea, is rolling and wooded, and noted for its bracing, healthful climate. Here in 1898 Camp Wikoff was established for the sick, wounded, and convalescent soldiers who had served in the Santiago campaign.

Montcalm, mŏnt-käm′ (Fr. môṅ-kälm), **Louis Joseph de Saint Véran,** loo-ē zhō-zĕf dė săṅ vā-răṅ, MARQUIS DE, French soldier: b. near Nimes 1712; d. Quebec, Canada, 14 Sept. 1759. He entered the army at 14, distinguished himself in the war for the Austrian Succession, and gained the rank of colonel in the battle of Piacenza, Italy, in 1746. In 1756, being then a brigadier-general, he was appointed to command the French troops in Canada, where he began operations against the English with great activity and success. Fort Ontario at Oswego was carried on 14 Aug. 1756, after a well conducted attack. The next year he took Fort William Henry, at the head of Lake George, which was held by a garrison of over 2,500 men, and thus became possessed of 42 guns and large stores of ammunition and provisions. In the campaign of 1758 he occupied the strong position of Fort Carillon (Ticonderoga), made it still stronger by intrenchments, and on 8 July held it with 3,600 men against a British force of over 15,000. His personal bravery had gained him great popularity among his soldiers, but the want of energy on the part of the home government, the scarcity of food all over New France, and personal dissensions between himself and the civil governor forbade him to look for much assistance; and he expressed his conviction that in a few months the English would be masters of the French colonies in America; yet he prepared as best he could for the campaign of 1759. The English had sent strong reinforcements and were preparing for an attack on Quebec. As the success of the whole compaign and indeed the conquest of Canada depended upon the taking of that city, Montcalm had concentrated his principal forces on the banks of the Montmorency River to protect it. In the first attack, 31 July, the English general, Wolfe, was repulsed; he later succeeded in landing his troops above Quebec, and on 13 September brought his whole force to the Heights of Abraham; Montcalm at once opposed his advance, but though he led the attack in person, his troops soon broke before the fire of the British. Wolfe fell in the moment of triumph; Montcalm was mortally wounded, and died the next morning. Consult: Parkman, 'Wolfe and Montcalm' (1885); Bonnechose, 'Montcalm et la Canada Française' (1877); Falcairolle, 'Montcalm devant la Postérité' (1886).

Montclair, mŏnt-klār', N. J., a town in Essex County, six miles northwest of Newark, on the New York & G. L., and the Lackawanna R.R.'s. The upper portion was originally called Speertown when settled by Hollanders from Hackensack, and the lower portion was first called Cranetown, then West Bloomfield, by its English settlers from Newark. It was at first included in Newark, and afterward in Bloomfield. It received its present name in 1865 and received its charter of incorporation in 1868. Montclair is situated on the first range of the Orange Mountains, at an average altitude of 300 feet, its highest point at 650 feet embracing an extensive view. It is noted for its healthful climate, and is principally a residential place, the home of many New York business men. It has a hospital, military academy, two orphan asylums, high schools, public library, State and savings banks. Its industrial establishments include electric construction works, printing establishments, etc. Pop. (1910) 21,550.

Mont-de-Marsan, town, capital department Landes, France, 65 miles S. of Boreaux. It has a Mineral Spring and manufactures resin and oil. Pop. 11,604.

Monte Carlo, mŏn'tē kär'lō, Monaco, a town of the principality about one mile northeast of the capital, celebrated for its Casino, the most luxuriously appointed gambling establishment in the world, founded in 1858. Monte Carlo is also noted for its scenic surroundings, its mild and healthful climate, and its attractive appointments of perfect roads, magnificent gardens, handsome promenades, and elegant residences. Its situation on an isolated elevation overlooking a bay of the Mediterranean is particularly beautiful. The 'Association of the Watering-Place and Strangers Club of Monaco,' with a capital of $6,000,000 in 60,000 shares, holds the contract, which was made with the late M. François Blanc and expires in 1913, whereby the reigning prince is paid annually the sum of $350,000 for the concession to play. The society practically bears also the cost of the temporal and spiritual government of the principality, its annual expenditure alone amounting to over $4,000,000. Roulette and trente-et-quarante (qq.v.) are the principal games played. Pop. 3,794. See Monaco.

Monte-Casino. See Casino, Monte.

Monte Cristo, mŏn'tē krēs'to, or krĭs'tō, a small island in the Mediterranean belonging to the Italian province of Leghorn, 28 miles south of Elba. In the 16th century it was ravaged by pirates, and as it is rocky and barren, rising 2,000 feet above the sea, it long remained uninhabited. Since 1874 there is a penal agricultural colony here. The elder Dumas has given the name of this isle as title of the hero of one of his most popular romances, 'The Count of Monte Cristo.'

Monte Rosa, rō'sä, on the Italian-Switzerland boundary, is an Alpine mountain mass of the Pennine ridge, with numerous peaks, eight of which are over 13,000 feet high. Dufour Spitze, the principal peak, is second to Mont Blanc as the highest peak of the Alps, reaching an altitude of 15,217 feet, 564 feet less than its rival, 50 miles to the southwest. Monte Rosa is covered on all sides with glaciers, chief of which is the Gorner Glacier on the west, 6½ miles long. The peak was first ascended — a most difficult feat — in 1855. Copper and iron mines are worked in the mountain.

Montecuculi, mŏn-tē-koo'koo-lē, or **Montecucoli, Raimondo,** Austrian military commander: b. near Modena 21 Feb. 1609; d. Linz 16 Oct. 1680. He entered the Austrian service, and served during the Thirty Years' war with great distinction. After the Peace of Westphalia (1648) he visited Sweden and England in a diplomatic capacity; and in 1657 the emperor sent him to the aid of the king of Poland against Rakoczy and the Swedes, and next year he assisted the Danes against the latter. In 1664 he gained a great victory over the Turks after having driven them out of Transylvania. In 1673 he was placed at the head of the imperial troops, and checked the progress of Louis XIV. by the capture of Bonn, and by forming a junction with the Prince of Orange in spite of Turenne and Condé. Montecuculi's subsequent advance into Alsace was repulsed by the Prince of Condé. His last military exploit was the siege of Philipsburg. The emperor Leopold made him a prince of the empire and the king of Naples gave him the Duchy of Melfi. His memoir on the Turkish war, written in Italian (1703), was translated into several languages. Consult: Campori, 'Raimondo Montecucoli, la sua famiglia e i suoi tempi' (1877); Grossmann, 'Raimund Montecucoli' (1878).

Montefiore, mŏn-tē-fē-ō'rē, **Claude G.,** English author and Jewish communal worker: b. London 1858. He studied at Balliol College, Oxford; identified himself with Hebrew charities and educational movements in London; was president of the Jewish Historical Society (1899–1900); and is head of the Anglo-Jewish Association, the Jews' Infant Schools, etc. With Israel Abrahams he edited 'The Jewish Quarterly Review' and wrote a series of sermons, 'Aspects of Judaism' (1895). He has published besides the Hibbert Lectures for 1892, 'The Origin of Religion, Illustrated by the Ancient Hebrews'; and 'Liberal Judaism' (1903).

Montefiore, Sir Moses, Jewish philanthropist: b. Leghorn, Italy, 24 Oct. 1784; d. Rams-

Moses Montefiore, Bart

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gate, England, 28 July 1885. He was descended from a family of wealthy Anglo-Italian bankers; was educated in London; became a leading member of the Stock Exchange; and retired from active business in 1824. From that time he devoted himself to the service of his race, working for the removal of disabilities and oppression under which the Jews in England and elsewhere had suffered great hardship. His wife, whom he married in 1812, was Judith Cohen, a relative of the Rothschilds, and in her Montefiore found a companion who entered ardently into his philanthropic undertakings. He was for a time high sheriff of Kent, and after long exclusion and repeated re-election was legally recognized as sheriff of London in 1837. In that year he was knighted, and in 1846 raised to a baronetcy in recognition of his meritorious public services. He distinguished himself by his practical sympathy for his race in various countries, chiefly in Poland, Russia, Rumania, and Damascus. He made seven journeys to the East, the first in 1827, and the last in 1874, mainly for the amelioration of the condition of the Jews. At Bucharest, during an anti-Jewish tumult, he boldly faced the mob at the risk of his life. At Ramsgate, in 1865, he endowed a Jewish college in memory of his wife, who died three years before. In his 100th year he was a type of hale and venerable manhood.

Montenegro, mŏn-tĕ-nā'grō (native, *Tzernagora;* Turkish, *Karadagh,* Black Mountain), an independent European principality in the northwest of Turkey, bounded north by Bosnia and Herzegovina, east by Bosnia, south by Albania, and west by the Adriatic Sea and a strip of Dalmatia. Its area was increased by the treaty of Berlin of July 1878, from about 1,710 to about 3,630 square miles. The country is a succession of elevated ridges, diversified here and there by a lofty mountain peak, some of them attaining elevations of 5,000 or 6,000 feet, or even 8,000 feet on the borders of the country, with a few beautiful and verdant plains and valleys, in which the soil is tolerably fertile; chief of these are the department of Tzernitza and the valley of Bielopavlich, watered by several streams, the principal of which is the Moratsa, which falls into the Lake of Scutari. The climate is healthful. Forests of oaks and holly, ash, beech, firs, walnuts, hazel, wild pears, poplars, willows, alders, and the sumach, used for dyeing and tanning, cover many of the mountain sides. The cultivated productions are Indian-corn, potatoes, cabbage, cauliflower, and tobacco, with several kinds of fruit-trees, including the peach, olive, pomegranate, mulberry, and others. In the department of Tzernitza, already mentioned, apples, vines, carobs, almonds, figs, quinces. walnuts, etc., also grow in abundance. Agriculture is in a rude state, though every cultivable piece of land, even if only a few feet square, is planted with Indian-corn, potatoes, or some other useful plant. Sheep, goats, and pigs are reared in great numbers; the two former affording a profitable supply of wool and cheese for exportation. Game is not abundant, but fish are taken in great quantities, and are of excellent quality, particularly the trout, which are celebrated, and some of them of immense size; and a kind of carp is caught in large quantities, and dried and salted for export to Vienna and Trieste. Manufactures, with exception of a coarse woolen stuff, are unknown. The chief occupations of the inhabitants are agriculture and fishing; the latter carried on principally in the Lake of Scutari, which lies partly in Albania. The exports of Montenegro are smoked mutton-hams, salted fish, wax, honey, hides, tallow, cheese, butter, cattle, and other agricultural produce. The chief imports are cattle, tobacco, salt, wine, brandy, coffee, sugar, and manufactured goods. The Montenegrins belong to the Serbian branch of the Slavonic family of peoples. They are generally of tall stature, and well proportioned, with singularly powerful voices, which enables them to carry on conversations at incredible distances; foreheads good, face rather square, moderately aquiline or straight nose, and animated eyes. Both men and women are robust: the latter are often beautiful when young but soon lose their good looks by laborious and unfeminine occupations. The people generally are cheerful in manner, extremely brave, and hospitable and courteous to all except the Turks, whom they hate. The men go at all times fully armed. The houses are of stone, generally with thatched roofs; but many are covered partly or entirely with wooden shingles. There are no towns in Montenegro, but there are some 300 villages, of which the chief are Cettigne (q.v.), the capital; Podgoritza (pop. 6,534); and the seaports Dulcigno and Antivari. The language of the Montenegrins is a Slavonic dialect. In religion they are all of the Greek Church. Education, which was formerly much neglected, is now becoming freely diffused, the public schools having increased from one in 1851 to about 70 in 1890. Montenegro, until 1851, was a theocracy, governed by a Vladika or prince, who was at once a bishop, a judge, a legislator, and a commander-in-chief. The office was hereditary in the family of Petrovitch from 1697. But as the Vladika could not marry, the dignity was inherited through brothers and nephews. In 1851 the civil and ecclesiastical offices were disjoined, the Vladika confining himself to the latter, while the former devolved on the Hospodar. The revenue of the principality was estimated for 1901 at about $400,000. Montenegro has no coinage of its own. Pop. about 228,000.

Montenegro formed a part of ancient Illyria, and in the Middle Ages belonged to the great Servian kingdom. The origin of the sacerdotal power dates from 1516, when the secular prince, having no children, withdrew to Venice, and transferred the government to the archbishop Germanos. In the reign of Peter the Great the Montenegrins placed themselves under the protection of Russia, both sharing in a common enmity against the Turks. In 1796 the Prince-bishop, Pietro I., inflicted such a loss on the Pasha of Scutari, who had invaded Montenegro, that for many years they left it unmolested. Pietro II. (1830–51) made strenuous efforts to improve the condition of his people by liberalizing the constitution, and attempting to reclaim his subjects from their vindictive and predatory habits. His successor, Danilo I., having separated the civil and ecclesiastical offices, Russia withdrew her subsidy of 8,000 ducats, but subsequently resumed payment of it, not, however, before great internal commotion had arisen from the necessary imposition of taxes to meet the deficit so caused. The Turks, led by Omar

Pasha, again invaded the country, but a treaty was arranged 15 Feb. 1853. Danilo was assassinated in 1860, and was succeeded by the present prince Nicholas I. In 1861 the Montenegrins excited a rebellion against the Turkish sway in the Herzegovina, the result of which was the infliction of such a chastisement on them that they were compelled (1862) to accept a disadvantageous peace, in which it agreed to the occupation of several points on the road from Herzegovina to Scutari by Turkish troops. In 1870, however, the principality managed to get these troops withdrawn. In 1876 Montenegro joined Servia in a war against Turkey, and on the conclusion of the Russo-Turkish war of 1877–8, it received, as already mentioned, an accession of territory by the treaty of Berlin.

Monterey, mŏn-tĕ-rā′, Cal., city in Monterey County; on Monterey Bay, and on the Southern Pacific railroad; about 100 miles south by east of San Francisco. The first settlements were made by the Spaniards, and in 1770 they founded here the mission of Saint Charles Borromeo of Monterey. It was the capital of the province from 1840 to 1845. Commodore Jones of the United States Navy captured the place in 1842, and held it for one day, under the erroneous impression that war had been declared against Mexico. Monterey was the capital of the military government of California in 1847. In 1849 the State Constitutional Convention was held here, and in 1850 the place was incorporated. The section in which the city is located consists of farm lands upon which are raised grains and fruits. Fishing and stock-raising are prominent industries. It is a favorite resort for summer and winter. Ruins of the old Spanish Mission are still to be seen. Some of the noted buildings are Colton Hall, in which the first State Constitutional Convention met, the old custom-house, and the San Carlos Mission. The city is the seat of San Carlos Academy, and it has good public and parish schools and a public library. Pop. (1890) 1,662; (1900) 1,748; (1910) 4,923.

Monterey, Mexico, capital of the state of Nuevo Leon; situated at the foot of the Sierra Madre mountains at an altitude of 1,800 feet above sea level; 168 miles from the Texas frontier. The most notable industry is a very extensive iron and steel mill, which employs a great number of men and produces immense quantities of heavy iron and steel manufactures, both rolled and cast. Over $25,000,000 are represented by the manufacturing and industrial enterprises of the city. No other point in northern Mexico is so important commercially, as Monterey. There are two local financial institutions, the Bank of Nuevo Leon, with a capital of $2,000,000 and the Mercantile Bank, with a capital of $2,500,000. The National Bank has a branch here and the Bank of London and Mexico, an agency. The principal educational institutions are the School of Jurisprudence, Normal School for males, Normal School for females and the Academy of Drawing. There is a Natural History Museum, and a public library with 4,500 volumes. The principal buildings of the city are the Juarez Theatre, the Cathedral and the churches of San Francisco and the Purisima. The streets are well paved. In the centre of the city there is a large spring of clear water. Four miles distant are the Topo Chico Hot Springs, the hourly output of which is 68,000 gallons. The waters of these are much like those of the famous hot springs of Arkansas. The prevailing style of architecture is Moorish. It was founded by the Spaniards in 1585 as Ciudad de Leon but renamed Metropolitan City of Our Lady of Monterey in 1596. The city was besieged in 1846 by Gen. Taylor and compelled to capitulate. See MONTEREY, BATTLE OF.

Monterey, Battle of, in American history; in the early part of the war between the United States and Mexico, Monterey, which occupies a strong natural position and was well fortified by art, was held by the Mexican General Ampudia, with about 10,000 regular troops. In August 1846, Gen. Taylor (q.v.) with a force of 6,625 men, mostly volunteers, marched from Matamoras to attack Monterey; and on 9 September he encamped within 3 miles of the place. Ten days were spent in reconnoitring, and on the afternoon of 19 September, Gen. Worth was orderd to march with his division around the hill occupied by the bishop's palace, to take a position on the Saltillo road, and to carry the enemy's detached works in that quarter, while the main body of the army were to make a diversion against the centre and left of the town by batteries erected during the night. In the morning these batteries opened upon the city, which replied by a heavy fire from the citadel and other works. The lower part of the city was assaulted and entered by the Americans, and a Mexican work of great strength captured after hard fighting by a brigade under Gen. Quitman. Gen. Butler also entered the town at another point with the First Ohio regiment. Meanwhile Gen. Worth carried the heights south of the river and the Saltillo road, and turned the guns of the Mexican works in that quarter upon the bishop's palace. The Mexicans evacuated the lower part of the city during the night, and early next morning Gen. Worth stormed the height overlooking the bishop's palace; and by noon that stronghold itself was taken by the Americans, and its guns turned upon its flying defenders. The houses of the city being solidly built and capable of defense, and the streets stongly barricaded, the Americans were forced to take each house in succession by breaking through the walls till they reached the principal plaza. The conflict lasted till the 23d, the Mexicans contesting desperately every foot of ground till nothing remained in their possession but the citadel. On the morning of the 24th Gen. Ampudia capitulated, and was allowed with his army to march out with the honors of war. The loss of the Americans in these operations at Monterey was 120 killed and 368 wounded. That of the Mexicans was not ascertained, but was probably much greater. See MEXICAN WAR.

Montesano, mŏn-te-sä′nō, Wash., town, county-seat of Chehalis County; on the Chehalis River, at the head of tide-water navigation, and on the Northern Pacific Railroad; about 45 miles west by south of Olympia. It is in a region in which the chief occupations are farming, lumbering, and fishing. It manufactures considerable lumber and lumber products, and has creameries. The salmon fisheries are quite important. Three miles above the town

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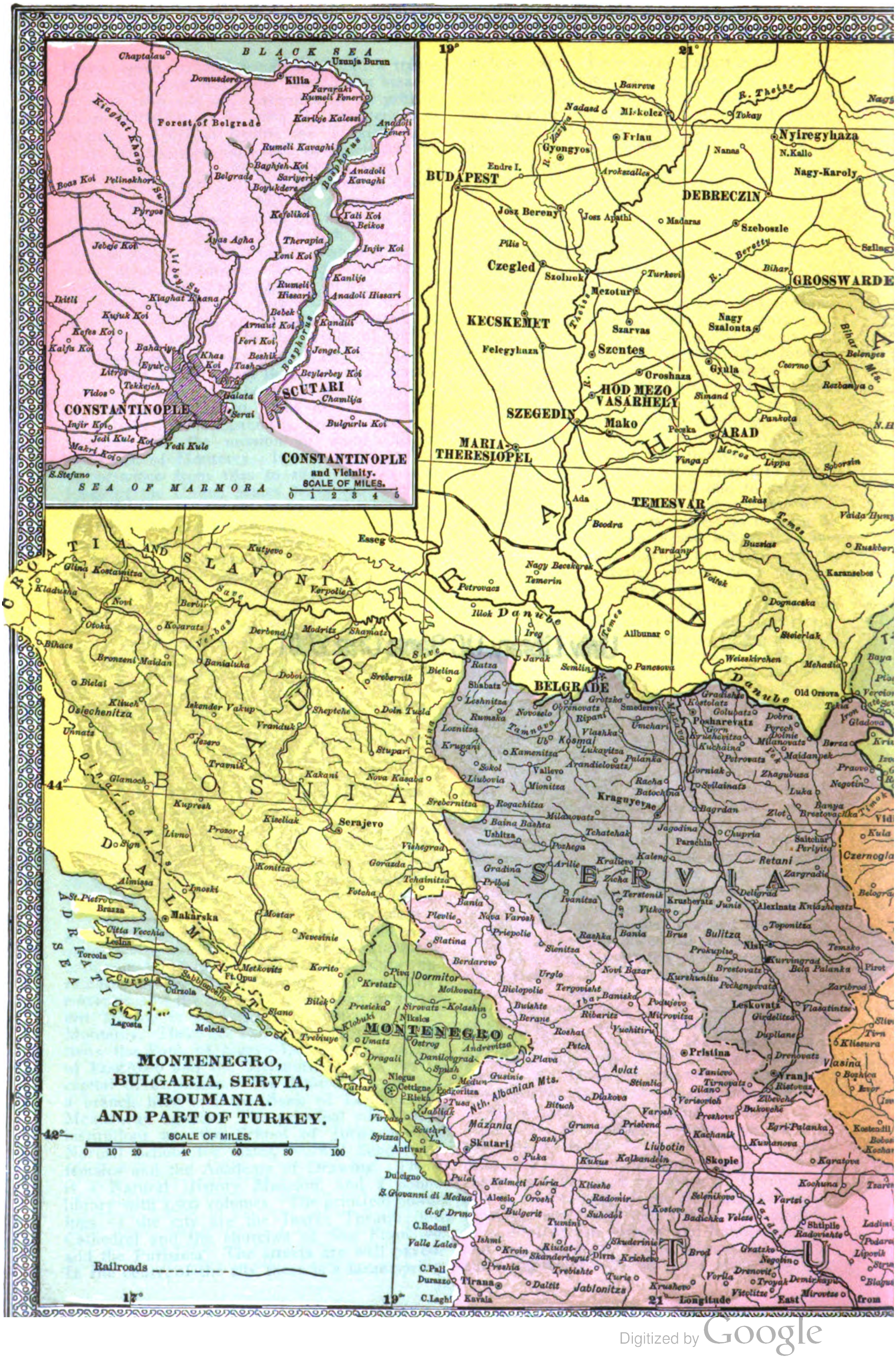
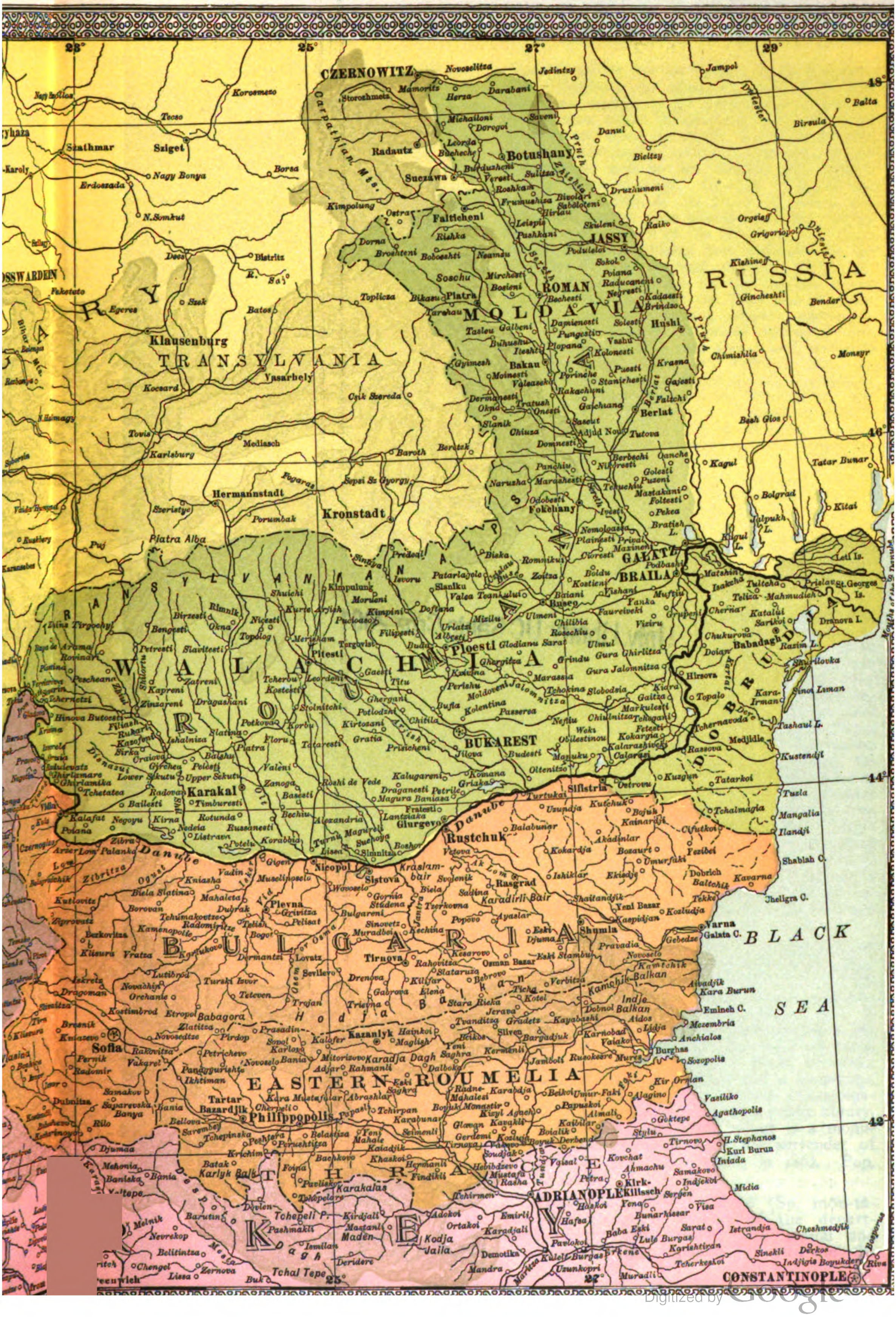


MONTENEGRO, BULGARIA, SERVIA, ROUMANIA. AND PART OF TURKEY.


RUSSIA
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TRANSYLVANIAN ALPS
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DOBRUDJA
TURKEY
THRACE
BLACK SEA
Carpathian Mts.
Danube
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Sereth
Dniester
Balkan
CZERNOWITZ
Botushany
Jassy
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Tultcha
Babadagh
Kustendji
Tchernavoda
Razim L.
Sinoe Liman
Kagul
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23°
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on the Chehalis River is a salmon hatchery. Pop. 1,300.

Montesinos, mōn-tā-sē'nōs, **Fernando,** Spanish historian: b. Osuna, Spain, 1593; d. Seville, Spain, 1655. He went to Lima, Peru, in 1610 and served under the government afterward becoming visitor of the audencia of Charcas, and councillor of the viceroy. By his considerate treatment of the Indians he won their friendship and their caciques placed at his disposal valuable information concerning their history. He ranks at the head of the Peruvian archæologists, and he published several able works on metallurgy. Among his books are: 'Ophyr de España, ó anales de los reynós de Quito y Lima' (1640); 'Memorias históricas del antiguo reyno de Quito' (1652); etc. See Prescott's 'History of Peru,' Vols. I. and II.

Montespan, Françoise Athenais, fräṅ-swäz ăth-ē-nā mōṅ-tĕs-päṅ, Marquise de, mistress of Louis XIV. of France: b. 1641; d. Bourbon-l'Archambault, 27 May 1707. She was the 2d daughter of the Duke of Mortemart, and was, in 1663, married to the Marquis de Montespan. To great beauty she added a natural liveliness and wit, and a highly cultivated mind. Soon after her appearance at court she attracted the king's attention, and from 1668 till 1674 shared his favor with Mlle. de la Vallière, but supplanting her in 1674; M. de Montespan after a detention in the Bastille had already been ordered to retire to his estate. Mme. de Montespan bore eight children to the king, four of whom died in infancy. The others were entrusted to the care of Mme. Scarron, afterward De Maintenon. The influence of Mme. de Montespan was often exercised in public affairs, and her sway over the king continued until about 1679, when a growing attachment to Mme. de Maintenon finally estranged his affections from Mme. de Montespan. She rarely appeared at court after 1685, and in 1691 entirely quitted it. Her last years were devoted to religious exercises, acts of benevolence, and penitence.

Montesquieu, mōṅ-tĕs-kū' (Fr. mōṅ-tĕs-kē-ė), **Charles Louis de Secondat,** shärl loo-ē dė sĕ-kōṅ-dä, Baron de la Brède et de, French author: b. near Bordeaux 18 Jan. 1689; d. Paris 10 Feb. 1755. He was educated at the Oratorian College of Juilly (near Meaux) and at Bordeaux; studied law; in 1714 became a counsellor of the parliament of Bordeaux; and in 1716 parliamentary president. He was an active participant in the proceedings of the Bordeaux Academy, writing papers on natural science, politics, and philosophy. The 'Lettres Persanes,' the first of the three great works on which his fame principally rests, appeared in 1721. Purporting to consist of the correspondence to and by two Persians traveling in France, this book is a lively satire upon the manners and customs, and the political and ecclesiastical institutions of the author's age and country. It is said to have passed through four authorized and other unauthorized editions within the year of publication. Montesquieu sold his president's office in 1726, and then visited Germany, Hungary, Italy, Holland, and England. In England he stayed for 18 months, imbibed a lasting admiration for its social and political institutions, and was elected to the Royal Society. He returned to France in 1731, and in 1734 published 'Considérations sur les Causes de la Grandeur et la Décadence des Romains,' one of the first important studies in the philosophy of history. It has been called Montesquieu's best in point of style, and when its brevity is considered (200 pp. in Laboulaye's collected edition), is remarkable as well for the original and weighty quality of its thought. In 1748 'L'Esprit des Lois,' the result of 20 years of labor, was published, and at once placed its author among the greatest writers of his country. The scope of the work is perhaps best indicated by the sub-title of the original edition, which describes it as a treatise on the relation which ought to exist between the laws and the constitution, manners, climate, religion, commerce, etc., of each country. It passed through no less than 22 editions in a year and a half, and won grudging praise even from Voltaire, who was fond of sneering at Montesquieu's reputation. Notwithstanding inaccuracies, digressions, and defective arrangement, it is throughout notable for its impressive assemblage of facts, its constructive ability, its wisdom, and its frequently epigrammatic style. It was the first work to establish a basis for legal principles, and it supplied the method of procedure in later historical studies in political science. Montesquieu was received a member of the Académie in January 1728. There is an edition of his works by E. Laboulaye (1875–9). Consult also the biographies by Vian (2d ed. 1879) and Sorel (1887).

Montesquiou-Fézensac, mōṅ-tĕs-kē-oo-fā-zän-säk, **Robert,** Count de, French poet: b. Paris 9 March 1855. He was well known as an art collector and as an amateur goldsmith and enameler in 1892, when he published 'Les Chauves-souris,' a volume of verse symbolizing the mystery of night. It was followed by 'Chef des Odeurs suaves' (1893), of which the theme was flowers and perfumes, 'Les Hortensias Bleus' (1896) and 'Perles Rouges' (1899), the latter a series of sonnets reviving Versailles at its glory; by 'Les Paons' (1901), on precious stones and their mystic meanings; and by two volumes of essays, 'Roseaux pensants' (1897) and 'Autels privilégiés' (1899), both attempting to appreciate some wronged artist. He appeared in New York in the winter of 1902–3 as a lecturer and reader. His style is hyper-æsthetic, with much weird beauty, and his themes strangely far-fetched.

Montevideo, Minn., village, county-seat of Chippewa County; at the junction of the Minnesota and the Chippewa rivers, and on the Chicago, Milwaukee and Saint Paul railroad; about 125 miles west of Saint Paul. It is in a fertile agricultural region where wheat is one of the important products. The chief industrial establishments are flour-mills, grain elevators, a creamery, cheese factories, and a cooperage. It is the seat of Windom Institute (Congregational) and it has a high school, a public library, and a town-hall. Near the village is a monument erected in memory of the surrender of Little Crow, the Sioux chief, in 1862. Pop. (1910) 3.056.

Montevideo, mŏn-tĕ-vĭd'ẹ-ō (Sp. mŏn-tā-vē'dā-ō), Uruguay, capital of the department of the same name; also capital and emporium of the republic; situated on the northern coast of the Rio de la Plata (see La Plata, Rio de). Founded in 1726, its inhabitants numbered only 3,500 in 1818, and 9,000 in 1829; indeed, it was scarcely more than a fortress until 1834, and at various times the governments of Argentina, England, and Brazil attempted to gain possession of this stronghold, commanding the entrance to the great waterway of the South. The demolition of the walls, the opening of new streets, and (in 1836) the beginning of foreign immigration, transformed the place. In the years from 1838 to 1841, about 28,000 European immigrants entered the port. There were 45,000 inhabitants in 1860; 105,000 in 1872; 238,080 in 1892; and at the beginning of 1902 about 278,186 in the territory of 256 square miles embraced in the department. Immigrants arriving in 1901 were: Italian, 3,777; Spanish, 2,708; Brazilian, 715; French, 512; German, 336; and English, 209. The harbor is the best on the Rio de la Plata; nevertheless it is far from being altogether satisfactory. An elaborate system of moles and docks was projected more than 10 years ago, and the work of harbor improvement actually began in July 1901. The water at the harbor's entrance being but 15 to 17 feet deep, vessels of great draught have formerly anchored in the outer roadstead, and discharged their cargoes on lighters. The city is built on a chain of hills of moderate elevation, with a gradual slope toward the shore; the conditions are therefore favorable for efficient drainage. An active commerce is maintained with foreign countries and towns of the interior. As it is the only port of entry, it furnishes nearly all of the revenue of the government, receiving or forwarding about 90 per cent of the importations of the entire country and about 67 per cent of the total exportations. In 1901 imports valued at $21,230,803, and exports valued at $18,849,177 passed through Montevideo. For 1899 the figures were: imports $21,876,987, and exports $23,340,239. Conspicuous buildings are the Parliament House, Government Palace, National Bank, Solis and San Felipe theatres, Uruguay Club, and School of Arts and Sciences. There are commercial houses of every class, street railways, telegraph and telephone service, electric light works, printing establishments, and foundries. The streets are wide, straight, and generally well kept. The water supply is obtained from the St. Lucia River, at a point about 12 miles distant. Plazas, 16 in number, occupy high ground in the middle of the city, the most attractive of these public squares being the Zabala, Independencia, and Constitución. The University of Uruguay has more than 400 students and a relatively very large number of native and foreign professors; there are also normal and elementary schools, a military college, etc. Banks are: English (2), and Italian, Spanish, and French (1 each). For courts, library, museum, and periodicals, see Uruguay. No city in South America is more cosmopolitan in character: nearly all the languages of the civilized world are heard in its streets. The environs contain beautiful residences, surrounded by gardens; at a distance of about three miles from the city is the fine park called El Prado. Montevideo was taken by a British force of 4,600 men on 2 Feb. 1807, after a vigorous assault by land and sea (English fleet under Commodore Popham). Subsequently the combined English forces in the river, under command of Gen. Whitelocke, were defeated at Buenos Ayres, and, withdrawing from Montevideo, abandoned the Rio de la Plata.

Marrion Wilcox,
Authority on Spanish America.

Montevideo, Department of. See Uruguay.

Mon'tez, Lola (assumed name of Marie Dolores Eliza Rosanna Gilbert), adventuress: b. Limerick, Ireland, 1818; d. Astoria, N. Y., 17 Jan. 1861. Her parents took the child to India, where her father died, and her mother, again marrying, sent Lola back to Europe. In 1837 she married a Captain James, went to India with him, tired of him, and returned to England in 1842. She next became a public dancer, performing in London and in cities of the Continent, and in 1846 went to Munich, where she fascinated the old artist-king Louis I. of Bavaria, who made her his mistress, created her Countess of Landsfield, and granted her a large annuity. For a while she also exercised great political power, which she directed against the Jesuits and in favor of liberalism; but with the outbreak of the revolution of 1848 she was once more set adrift. In London she married a guardsman, Stafford Heald, was soon divorced from him, and in 1851 sailed for the United States. After touring through this country with a play called 'Lola Montez in Bavaria,' she went to Australia, returned here, was twice married in California, and in 1858 lectured in New York where she settled and spent her last days in rescue work among women. Her writings include 'Lectures,' with an autobiography, and 'The Arts of Beauty' (1858).

Montezuma, mŏn-tẹ-zoo'mạ (Aztec Motecuhzoma, the severe or sad one; found written also Monteçuma, Moctezuma, Muteczuma, Motezuma), surnamed Ilhuicamina (archer of heaven) and called Montezuma I., chief, or emperor, of ancient Mexico: b. about 1390; d. 1464. He succeeded his brother Izcohuatl in the chieftainship in 1436, but was not inaugurated until 1440. His success in war with neighboring tribes was great, and he is said to have extended Mexican conquest to the Gulf. With Netzahualcoyotl, chief of Tezcuco, he built, to prevent inundations from Lake Tezcuco, huge dams, the ruins of which in the San Lorenzo Valley have shown them to have been a marvelous feat of engineering. He also rebuilt Tenochtitlan (on the site of the modern Mexico), the chief Aztec city, substituting for the primitive buildings others of lime and stone; established a severe legal code; and developed the ceremonial and influence of the tribal religion.

Montezuma, surnamed Xocoyotzin and called Montezuma II., chief, or emperor, of ancient Mexico: b. 1479 (authority of Bernal Diaz); d. Tenochtitlan, Mexico, 30 June 1520. He is well known as the ruler of the Aztecs at the time of the Spanish invasion. He succeeded his uncle Ahuizotl as chief in 1503. Almost constant wars were carried on by him with the Tarascans and Tlascalans, and he is said to have led an expedition as far south as Honduras. His internal policy was in many respects wise. He severely enforced the laws, introduced valuable changes in the courts, and built many public works, including temples, a new conduit for the water-supply, and a hospital for invalided warriors. But by his arrogance and pomp, his seclusion, his restriction of appointments to those only of noble rank, and his heavy taxation he made himself greatly disliked. His conquests enlarged the empire, but the various parts were without cohesion, and insurrections were frequent. When news was brought in 1518 that ships and white men (of Jean de Grijalva's expedition) had been seen off the coast, Montezuma was greatly alarmed, because an ancient prophecy foretold that Quetzalcoatl, the white god, would at some time come to reign over Mexico. He sent presents to Cortéz, who had landed at Vera Cruz in April 1519, and tried to prevent him from marching to Tenochtitlan. Cortéz, however, arrived there in November, and was well received. Fearing an outbreak of the people, who did not agree with the conciliating policy of the monarch, Cortéz then took Montezuma prisoner, and retained him as a hostage in the quarters of the Spaniards. The Aztecs finally made an attack upon the quarters. (June 1520). Montezuma, at the request of Cortéz, attempted in a speech from the wall to end hostilities, but was wounded by a volley of stones and died four days later. The Indians came to regard him as a deity, and indeed called him their chief god, though this reverence did not include worship. Consult: Prescott, ‘Conquest of Mexico’ (1843); H. H. Bancroft, ‘Mexico,’ Vol. I. (Vol. IX. of his ‘Works’ 1883–90); Bernal Diaz, ‘Historia verdadara de la conquista de la Nueva España.’

Montezuma, Iowa, town, county-seat of Poweshiek County; on the Chicago, R. I. & P. and the Iowa C. R.R.'s; about 60 miles east of Des Moines. Agriculture and stock-raising are the principal industries of the surrounding region. Bituminous coal-fields are in the vicinity. The chief industrial establishments are a pearl-button factory, wagon factory, foundry, machine-shop, and a creamery. Pop. (1890) 1,062; (1900) 1,210; (1910) 1,300.

Montfaucon, Bernard de, băr-năr dė môṅ-fō-kôṅ, French critic and classical scholar: b. Languedoc, France, 18 Jan. 1655; d. Paris 21 Dec. 1741. He entered the army but resigned to become a Benedictine monk and devoted himself to classical studies. His ‘Palæographia Græca,’ published in 1708, made him famous and constituted him the founder of scientific palæography. He traveled in Italy where he was honored by Innocent XII. and in 1719 was elected a member of the Academy of Inscriptions. In the course of his work he examined thousands of manuscripts and his books are a storehouse of classical archæology. Among them are: ‘L'Antiquité expliquée et representée en Figures’ (15 vols. 1719–24); ‘Monuments de la Monarchie française’ (5 vols. 1729–33).

Montferrat, môṅ-fĕr-rä, Italy, a former independent duchy, bounded by Piedmont, Genoa, and the Milanese territory. It lay in two detached portions between the Maritime Alps and the Po, and had an area of about 1,000 square miles. The capital was Casale. Mention is made of a Marquis of Montferrat in 980. In 1305 the marquisate was inherited by a branch of the imperial family of the Palæologi, and in 1536 was granted by Charles V. to Federico II., duke of Mantua. It was erected into a duchy by Maximilian in 1573 or 1574. In 1631 a considerable part of it was ceded to Savoy by the Duke of Mantua, to whose ancestors Charles V. had granted it in 1536, and in 1708 the remainder was annexed to the same duchy. See Savoy.

Montfort, mŏnt'fŏrt (Fr. môṅ-fôr), **Simon de,** EARL OF LEICESTER, English political reformer: b. France about 1208; d. Evesham 4 Aug. 1265. His father was Simon, the Conqueror of the Albigenses, his mother, Alice of Montmorency; the former had been disinherited of his English estates by King John in 1207 and hence had joined the more readily the orthodox French party in fighting the Albigenses, who were led by John's brother-in-law, Raymond of Toulouse. But the younger and greater Simon in 1229 was forced to leave France and throw himself on the mercy of the English king, Henry III., who restored him his lands in Leicester, and married him to his own sister Eleanor, secretly and without dowry in 1238. The irregularity of this match endangered Simon with the nobles, who had not been consulted; almost immediately afterward he quarreled with the king and was only saved by his crusader's vow, which he fulfilled under Richard of Cornwall in 1240. In France he fought under Henry III. (1242–8), who made him commander of the army in Gascony. There he crushed successive rebellions, but another quarrel between the monarch and his subject followed and Simon was removed from office. Henry soon had to recall Simon, who in 1257 and 1258 quarreled hotly with William of Valence, one of the king's foreign favorites and his half-brother. Simon's boldness in this matter put him at the head of the movement among the barons for administrative reform. In June 1258 the 24 commissioners, of whom he was one, drew up the famous Provisions of Oxford, signed in October of the same year, but repudiated in 1262 by the king. Simon de Montfort had been actual head of the reforming party since the conclusion of the peace with France (4 Dec. 1259), which had made reform possible. Now, after the cause of the nobles had been submitted to the King of France to arbitrate and his sentence had been entirely favorable to the king, setting aside the Oxford Provisions entirely, and reserving to the people only such rights as they had before possessed, Simon put himself at the head of the party which was eager to fight for the privileges of the nobles. On 16 May 1264, after a brilliantly conducted engagement, Simon captured the king; a new constitution was formed giving the power to a council of nine, over whom were three electors, removable by Parliament; and in this new régime Simon was practically master of the kingdom. He summoned a Parliament 30 Jan. 1265, which was the actual basis of the present English Parliament and of British constitutional freedom. But the Parliament was marked by a quarrel between Simon and the Earl of Gloucester; the latter went over to the border nobles. Simon moved against him with splendid fearlessness; made a sudden peace with the Welsh king; and turning to meet Gloucester failed to effect a juncture with his son. At Evesham on 4 Aug. 1265 he was slain, his forces being so outnumbered by the troops with Gloucester and Prince Edward that at sight of the enemy Simon is said to have exclaimed, "Let us commend our souls to God, for our bodies are theirs.» Personally haughty and high tempered, but sober, simple, pious, and cultured, he was a great general, one who stood firmly by the right, the idol of the people, who made his tomb a shrine and carried on the work he had begun. To call him the «creator of the House of Commons» is a misapprehension of his work, which forwarded rather than fathered representative government. Consult: Pauli's life which treats primarily of the constitutional bearings of Montfort's career and is translated into English by Miss Goodwin (1876); the English life by Prothero (1877); the French biography by Bémont (1884), which first untangles Montfort's continental career; the ‹Song of Lewes,› edited by Kingsford (1890); the ‹Miracles of Simon de Montfort,› edited by Halliwell for the Camden Society (1840), showing the popular canonization of the hero; and such general works as Stubbs, ‹Constitutional History,› Vol. II., and Green, ‹History of the English People,› Vol. I.

Montgolfier, mŏnt-gŏl'fĭ-ėr (Fr. môṅ-gŏl-fē-ā), two French inventors, Joseph Michel (b. Vidalon-les-Annonai, France, 1740; d. Balarue-les-Bains, 26 June 1810); and Jacques Etienne (b. Vidalon-les-Annonai, 7 Jan. 1745; d. Servières, 2 Aug. 1799). They were sons of a paper-maker and devoted themselves to the study of mathematics, mechanics, physics, and chemistry. As their scientific labors were always carried on in combination it is not easy to decide to which of the two the credit of their several inventions is due. The first idea of the balloon seems to have arisen in the mind of Joseph, but Jacques Etienne suggested many improvements upon it. Joseph was also the inventor, among other things, of the water-ram which raises water to the height of 60 feet, and Jacques Etienne of vellum paper, which he was the first to make in the manufactory formerly carried on by his father. See Balloon.

Montgomery, mŏnt-gŭm'ē-rĭ, **Florence,** English novelist: b. 1843. She was a daughter of Admiral Montgomery, 3d baronet, and began her literary career through the encouragement of Whyte Melville, the novelist. Among her books are: ‹A Very Simple Story› (1866); ‹Misunderstood,› a pathetic fiction and the work by which she is best known (1869); ‹Thrown Together› (1872); ‹Transformed› (1886); ‹Prejudged› (1900).

Montgomery, môṅ-gōm-ē-rē, **Gabriel,** Count de, French captain: b. about 1530; d. Paris 26 June 1574. He was son of the commander of the Scottish troops in the service of the French court, but in 1559 he accidentally wounded King Henry II., with whom he was jousting, and killed him. Montgomery was condemned to retirement in the country, where he read many religious books, and was soon led to join the Protestant party. In 1562 he entered Condé's army; served with much bravery and ability; and in 1574 was captured, taken to Paris, tried, and executed.

Montgomery, mont-gŭm'ē-rĭ, **George,** American Roman Catholic archbishop: b. Daviess County, Ky., 30 Dec. 1847; d. San Francisco, Cal., 10 Jan. 1907. He was educated at St. Charles College, Md., and St. Mary's Seminary, Baltimore, and was ordained to the priesthood in 1879. He officiated as a priest for 15 years in San Francisco and in 1894 was consecrated coadjutor bishop of Los Angeles. He was elevated to the rank of coadjutor archbishop of San Francisco in 1902.

Montgomery, James, British poet and journalist: b. Irvine, Ayrshire, 4 Nov. 1771; d. Sheffield, Yorkshire, 30 April 1854. In 1792 he procured an engagement with a bookseller in Sheffield, the proprietor, editor, and publisher of the Sheffield ‹Register.› Montgomery succeeded him later as editor and publisher of the paper, the name of which he changed to the Sheffield ‹Iris.› The conducting of a liberal journal was at that period fraught with manifold dangers. He was twice prosecuted for trivial offenses, and condemned on the first occasion to three and on the second to six months' imprisonment. During his confinement he composed a volume of poems, ‹Prison Amusements,› published in 1797. In 1806 appeared his ‹Wanderer in Switzerland,› the first popular effort of his. It was followed in 1809 by the ‹West Indies,› a poem designed to expose the iniquities of the slave-trade. Later volumes were ‹The World before the Flood› (1813); ‹Greenland,› a missionary poem (1819); and ‹The Pelican Island› (1827). In 1825 he resigned the editorship of the ‹Iris,› and henceforward spent his life in religious and literary labors, and to the world of to-day he is known as a hymn writer, over 100 of his hymns still keeping their places in hymnals.

Montgomery, John Berrien, American naval officer: b. Allentown, N. J., 17 Nov. 1794; d. Carlisle, Pa., 25 March 1873. In 1812 he entered the navy as midshipman and was on board Perry's flagship at the victory on Lake Erie in 1813 where he performed excellent service and received the thanks of Congress. He was later engaged at Mackinaw in 1814 and in 1815 served in the Algerine war. In 1839 he became commander, and in the war with Mexico commanded the Portsmouth and established United States authority on the coast of California, blockaded Mazatlan, and assisted in the capture of Guaymas. In 1849–51 he was executive officer of the navy-yard at Washington and he commanded the Pacific squadron in 1861–2. He was made a commodore in 1862 and rear-admiral on the retired list in 1866. Consult: ‹A Genealogical History of the Montgomery Family› by T. H. Montgomery (1863).

Montgomery, Richard, American soldier: b. Convoy House, near Raphoe, Ireland, 2 Dec. 1736; d. Quebec 31 Dec. 1775. At 18 he obtained a commission in the British army, in 1757 began his career of active service in America, and at the siege of Louisburg in 1758 and elsewhere gave evidence of high military capacity. In 1772 he sold out his commission, and, emigrating to New York, settled in Rhinebeck, Dutchess County. In 1775 he represented Dutchess County in the provincial Congress, and in the same year was appointed one of the eight brigadiers to serve in the newly organized army of the united colonies. He was immediately attached to the larger of the two divisions sent to Canada in the summer of 1775 and by a series of well directed movements successively acquired possession of Chambly, St. John's, and Montreal, thereby becoming in the middle of November master of a great part of Canada.

Effecting a junction on 4 December with Arnold's troops, then recently arrived, he immediately proceeded to take a position before Quebec. At a council of officers it was determined to attempt to capture the place by a *coup de main,* and accordingly, on 31 December at 2 A.M., an attack on the town was begun. Montgomery, who headed the attack on the Cape Diamond bastion, fell dead at the first and only discharge by the British artillerymen. His men, panic-stricken by the loss of their leader, began a disorderly retreat, and the assault on the city ended in failure. He was interred within the city walls. Congress testified "their grateful remembrance, profound respect, and high veneration" for him, by erecting a monument to his memory in the front of St. Paul's church, New York. In 1818 the State of New York caused his remains to be removed and placed beneath the monument.

Montgomery, Robert, English poet and Anglican clergyman: b. Bath 1807; d. Brighton 3 Dec. 1855. He is chiefly famous for having been mercilessly ridiculed by Lord Macaulay in the 'Edinburgh Review.' Having taken orders in the Church of England, he officiated at Percy Street chapel in London till his death in 1855, with an interval of four years as pastor of St. Jude's Episcopal chapel in Glasgow. His chief works, which amply justify Macaulay's strictures, though hardly their tone, are 'The Omnipresence of the Deity' (1828); 'Satan' (1839), whence his sobriquet of "Satan Montgomery"; and 'The Messiah.'

Montgomery, Ala., a leading Southern trade and social centre; State capital and second city of the State in population, and seat of Montgomery County, a little southeast of the centre; on the left bank of the Alabama, 410 miles above the Gulf by water and 180 by rail. It is the greatest railroad centre in the State, seven lines converging there, the Louisville & Nashville, Mobile & Ohio, Atlantic Coast Line, Central of Georgia, Seaboard Air Line, Union Springs & Northern, and Western of Alabama; 45 passenger trains a day arrive and depart from its union station.

Montgomery lies in the heart of the famous Black Belt, the band of rich dark soil which stretches across and beyond Alabama, 50 miles wide, and one of the chief cotton districts in the country, as well as a great producer of grain, fruit, and vegetables. It is the great central market of all this territory, and one of the foremost trucking centres for the supply of vegetables to the Northern markets; its wholesale grocery business amounts to some $10,000,000 a year, out of a total business of over $40,000,000. It is one of the chief cotton marts and distributing points of the South, handling 150,000 to 175,000 bales a year in its extensive warehouses. The export of this is to some extent sent in barges down the river to Mobile, and there reloaded for foreign shipment. The Alabama is one of the best rivers in the United States for steamer navigation, having a deep, broad channel open as high as Montgomery for eleven months in the year; and a weekly line of large freight steamers, with a gross annual tonnage of over 500,000, runs between Montgomery and Mobile, besides two other lines.

Lying between the coal and iron fields on the north and the vast forests of yellow pine on the south, as well as in the midst of the cotton belt, the city has great natural advantages for manufacturing; and a dam across the Tallapoosa at Tallahassee, 30 miles away, furnishes 5,000 horse-power soon to be applied to its manufactories, at present used for trolley and lighting. Even now the city's interests are considerable and varied. In 1909 it had 73 establishments, employing $5,234,000 capital and 2,777 employees, paying $1,356,000 in wages and salaries, and turning out $5,442,000 in products. Car-shop and foundry work for the numerous railroads, with boilers and other iron goods, was the largest item; but there are two cotton factories and a cordage factory; four ginning and compress plants; three cotton-seed-oil and cake works and two great fertilizer plants; 13 woodworking and lumber concerns, besides cooperage works (mainly for the oil and allied products), carriages, furniture, etc.; confectionery, a heavy interest; crackers; brooms and brushes and paper boxes; saddlery and harness; brick and tile, paving and roofing materials, from the clays close at hand; malt and distilled liquors, ice, and other things. Its banking facilities have kept pace with the increase. It has three national and one private bank. In 1910 Montgomery had 4 national banks, having a combined capital of $2,000,000; surplus, $515,000; undivided profits, $233,713; individual deposits, $4,131,059; U. S. deposits, $50,438. The post-office receipts had increased 25 per cent within five years. There are two trolley systems covering city and suburbs and electric light, good sewerage, and artesian water almost chemically pure; the streets are well paved, and the country roads radiating from it of remarkable excellence. Assessed valuation, about $20,000,000. Montgomery was one of the five cities of Alabama in August, 1911, which had commission government. Of about $300,000 yearly expenditure aside from interest on debt, $30,000 is for schools.

The city is handsomely built on a high red-clay bluff bordering the river, and stretching back to undulating hills; it has many fine old gardens, and 50 acres of public parks. The centre is Court Square, and the foundation streets are Court Street, Commerce Street toward the river, and Dexter Avenue to the capitol. The splendid new union station costing $250,000, the government building, the city-hall and court-house, the Masonic Temple, and the Carnegie Library, are the chief structures in the centre. Estelle Hall, the Faneuil Hall of the city, is historically interesting from the great political speeches made in it. The capitol dates from 1851; in its grounds is a handsome Confederate monument. There are about 50 church societies, of all denominations; several of them with handsome, modern edifices. There is a State Normal School for the colored here, the Baptist Academy, Lagrange Academy, the Montgomery Industrial School for Girls, and charitable institutions. There are three daily newspapers, and several institutional libraries. The population in 1840 was 2,179; 1850, 6,728; 1860, 8,843; 1870, 10,588; 1880, 16,713; 1890, 21,883; 1900, 30,346; 1910, 38,136, about half of whom are colored. Its suburbs, however, have far overspread the official limits, and the aggregate population within a few miles is toward 60,000.

Montgomery was founded in 1817 by Andrew Dexter of Rhode Island, on the site of the legendary Indian village of Ecunchatty; it was part of the Creek lands. Dexter named the place New Philadelphia; the situation was tempting, and in 1818 two more settlements were made,— East Alabama Town closely adjoining, divided by the present lower Court Street (whence the streets on its two sides run from it at different angles), and Alabama Town a mile or so down the river. On 3 Dec. 1819 the former was consolidated with it as Montgomery; named either after the Indian fighter Lemuel Montgomery or the Revolutionary hero Richard Montgomery. The early society was like many pioneer communities, and vigilance committees had to be invoked to restore the reign of law. The first steamer arrived 22 Oct. 1821; the Montgomery Railroad opened its first 12 miles in 1840. The place received a city charter in 1837; on 22 Jan. 1846 it was made the State capital; the capitol was occupied 1847, burned 1849, replaced by the present in 1851. Its interests and excessive colored population made it the focus of the secession movement; its position as capital drew in some of the ablest leaders and orators of the South, the famous William L. Yancey being one; and it was made the first capital of the Southern Confederacy, whose government was organized there 4 Feb. 1861. The next year the capital was removed to Richmond; the Union army reoccupied Montgomery 12 April 1865.

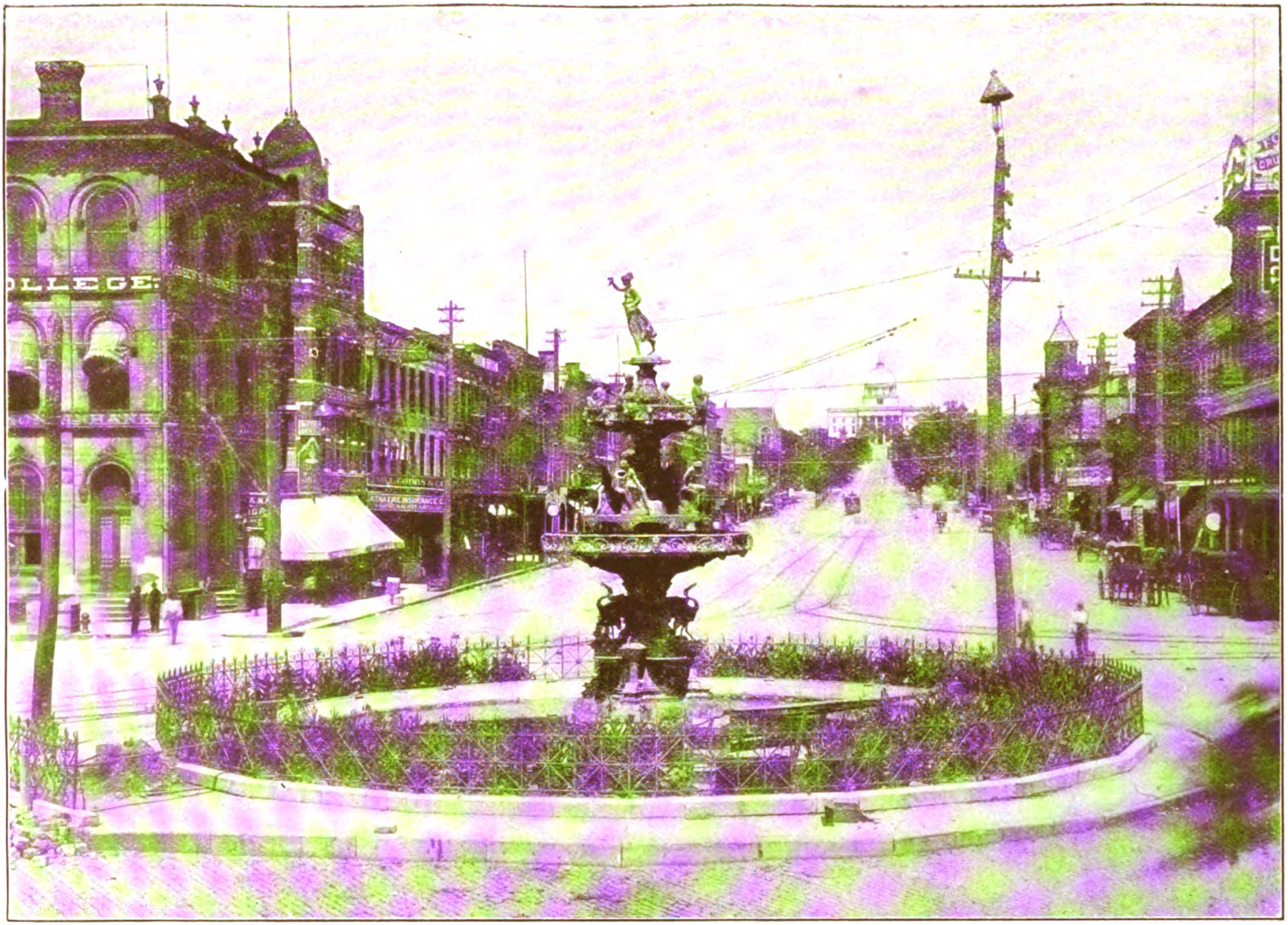
L. L. Gilbert,
Sec'y the Commercial and Industrial Association, Montgomery, Ala.

Month, a period of time derived from the motion of the moon. The «sidereal» month may be regarded as the period in which the moon, as seen from a fixed star, would appear to make a complete revolution round the earth; it is evidently the period in which she passes through the 12 signs of the zodiac; its mean value during the year is 27.32166 days. The «synodical» month, more commonly called a «lunar month» or «lunation,» is the period during which the moon goes through all her phases. It is usually reckoned from new moon to new moon; to complete the lunation the moon must not only pass through the 12 signs of the zodiac, but also come again to occupy her old position relatively to the sun, which has itself advanced in the zodiac, hence the lunar is longer than the sidereal month. The mean value of the lunation is 29.5306 days. The «solar» month is the 12th part of one solar year, or 30.4368 days. The «anomalistic» month is the period in which the moon passes from perigee to perigee of her orbit; it differs from the sidereal month because the perigee varies its position. The line of nodes of the moon's orbit varies its position, and the «nodical» month, or the period of her motion from ascending to ascending node, differs from the other months mentioned above. The 12 civil or calendar months of the year have from 28 to 31 days each. The lunar month was used by the Chaldæans and Egyptians, and is still by the Jews, Turks, and many uncivilized nations. The calendar months are not equal divisions of the year, some (April, June, September, and November) consisting of 30, and the remainder of 31 days, except February, to which a period of only 28 days is assigned (see Leap Year), with the addition every fourth year of one more day. These distinctions often give rise to much confusion as to the time intended to be designated by a month. In popular language it is often understood to be four weeks, as this is very nearly an equal period, expressed in the division by weeks, to the month. This is even laid down by Blackstone as the legal definition of the term, so that a lease for 12 months is only for 48 weeks; but the expression of «a twelve-month» has been legally held to mean a solar year. See Calendar.

Montholon, Charles Tristan, shärl trēs-täṅ môṅ-tō-lôṅ, Comte (later Marquis) de, French soldier: b. Paris 21 July 1783; d. 21 Aug. 1853. After service in the navy, he entered the army in 1798, took part in the Napoleonic campaigns in Italy, Austria, and Prussia, distinguished himself at Wagram (5-6 July 1809), was made chamberlain (1809), was sent on an important diplomatic mission to the Archduke Ferdinand of Austria (1811), and became general of brigade (1814). During the Hundred Days he was adjutant-general to Napoleon, whom he accompanied to St. Helena, and by whom he was appointed an imperial executor. Proclaimed chief-of-staff by Prince Louis Napoleon in 1840, he was therefore condemned by the Peers to 20 years' imprisonment, but was liberated after the February revolution (1848). He published ‘Mémoires pour servir à l'Histoire de France sous Napoléon, Ecrits à Sainte Hélène sous sa Dictée’ (with Gourgaud 1822-5; 2d ed. 1830), and ‘Récits de la Captivité de Napoléon’ (1846).

Month's Mind, the name given to the requiem mass celebrated in the Roman Catholic churches the 30th day after decease of the person for whom the mass is offered. The prayers of the mass are the same as those of the requiem mass celebrated on the day of decease or burial except the «Collect,» «Secret,» and «Post-Communion.» Consult: ‘Missal’; O'Brien, ‘The Mass’; Sullivan, ‘History of the Mass.’

Monti, Vincenzo, vēn-chĕnd'zō mŏn'tē, Italian poet: b. Fusignano near Ravenna 19 Feb. 1754; d. Milan 13 Oct. 1828. He became secretary to Prince Luigi Braschi, won his literary spurs with ‘Saggio di poesie’ in 1779, gained speedy popularity with various occasional odes, and in 1787 and 1788 brought out his two great tragedies, ‘Aristodemo’ and ‘Galeotto Manfredo,’ both in the style of Alfieri. His ‘Basvilliana,’ a Dantesque poetic chronicle of recent happenings, notably the massacre of the French envoy Basville by the Roman populace, showed ability to treat a theme in politics; but from the detestation expressed in that poem for the excesses of the Revolution, and his appeal to the Austrians against the French, he soon came to the most ardent praise of Napoleon, and fled to France to escape punishment from Austria. His panegyric of the mathematician Mascheroni (1801) is largely an attack by the poet upon his personal enemies. After Marengo he returned to Italy, and became professor of oratory at Pavia, imperial poet-laureate in Milan, and, after the coronation of Napoleon, historiographer of the Italian kingdom. From that time until the restoration of Austrian rule in Italy, Monti was devoted to Napoleon and sang repeatedly odes of victory in his honor.



COURT SQUARE AND DEXTER AVENUE, MONTGOMERY, ALA.

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In his latter years he joined his son-in-law Giulio Perticari, in his fight with the Della Cruscans, and published his single great work, a version of the ‘Iliad’ (1810). His translation of Persius should be mentioned and his most successful drama, ‘Caio Gracco’ (1802). Monti was an ardent classicist, and in his ‘Sermone sopra la mitologia’ (1825) combated romantic tendencies. Consult the biographies and appreciations by A. Monti (1873), Vicchi (1879–87), and Zumbini (1894); and the Milan (1839), or Florence edition (1817) of his works.

Monticelli, môṅ-tē-cĕl'lē or mŏn-tē-chĕl'lē, **Adolphe,** French painter: b. Marseilles 1834; d. there 1886. He began his art studies at the academy of his native city, but early turned his steps to Paris, where he painted under the eye of Delacroix and Diaz. His first manner bears traces of Titian's influence, but he also imitated the masters of the Dutch and Flemish schools. His portraits recall the dignity and ease of Velasquez; but he especially excelled in painting such festal gatherings of high society as Watteau loved to depict. His fine ladies and gentlemen are etherealized into a grace, elegance, and lustre more than mortal, and such pictures as his ‘Court of Henry III.’ are almost to be called scenes from romance and fairyland. Coloring and drawing are alike admirable in all his productions, but at last his style degenerated into extravagance; he reached the condition of mental alienation described by Balzac in his ‘Chef d'œuvre inconnu’ and died in great poverty.

Monticello, mŏn-tē-sĕl'lō, Ark., town, county-seat of Drew County; on the Saint Louis, Iron Mountain & Southern railroad; about 81 miles south by east of Little Rock. It is in a cotton growing and lumbering region. The industries and trade are connected with lumber, fruit, cotton, and grain. Some attention is given to stock raising. It is the seat of the Hinemon University school and has the Arkansas Orphans' Home (Baptist). Pop. (est.) 1,700.

Monticello, Fla., town, county-seat of Jefferson County; on the Florida C. & P. (Seaboard Air Line), the Savannah, F. & W. (Plant System) R.R.'s; about 32 miles east by north of Tallahassee. It is in an agricultural section, where the chief product is fruit. Monticello prepares and ships for northern markets large quantities of fruit. Pop. (1890) 1,218; (1900) 1,076; (1910 est.) 1,300.

Monticello, Ill., city, county-seat of Piatt County; on the Illinois C. and the Wabash R.R.'s; about 147 miles south by west of Chicago. It is situated in an agricultural and stock-raising region. Its chief manufactures are foundry and machine shop products, dairy products, patent medicines, tile, brick, wagons, and carriages. It is the trade centre for a large part of Piatt and the nearby counties, and ships considerable hay, live-stock and vegetables. Pop. (1890) 1,643; (1900) 1,982; (1910 est.) 2,100.

Monticello, Ind., town, county-seat of White County; on the Tippecanoe River, and on the Chicago, I. & L., and the Pittsburg, C., C. & St. L. R.R.'s; about 75 miles north by west of Indianapolis. The river furnishes good water power for manufacturing. The chief manufacturing establishments are flour and lumber mills and creameries. The town owns and operates the waterworks. Pop. (1890) 1,518; (1900) 2,107; (1910) 2,500.

Monticello, N. Y., village, county-seat of Sullivan County; the terminus of the Port Jervis, Monticello & New York railroad; about 67 miles northwest of New York city. It is situated in an agricultural region from which large quantities of potatoes, apples and a considerable amount of dairy products are shipped to New York markets. The village is a favorite summer resort on account of its pleasant climate and beautiful scenery. Pop. (1890) 1,518; (1900) 2,107; (1910) 1,941.

Monticello, mŏn-tē-sĕl'lō (Little Mountain), the estate and residence once owned by Thomas Jefferson (q.v.), third president of the United States. It is in Albemarle County, Va., about two miles from Charlottesville. The estate was an unbroken forest in the early part of the 18th century, until in 1735 the land came into possession of the father of Thomas. Peter Jefferson, the father, and his brother-in-law decided to «go West» and try a new country, so they left the tide-water settlements on the James River and journeyed about 100 miles toward the west, to what is now Albemarle County, and located 20 miles east of the Blue Range and among the foot-hills of the Southwest Mountains. Peter Jefferson «patented» a tract of land of about 1,000 acres. In looking over his new possession he found no site for a home, such as pleased him; his neighbor, Randolph, sold him from his tract 400 acres for «Henry Weatherbourne's biggest bowl of arrack punch.» The place was then called Shadwell, after Shadwell Street in London, and the country around Goochland. Thomas Jefferson was born in the old residence at Shadwell, and this house was his home for 27 years. From his boyhood his favorite spot on the estate was Little Mountain. Often he and his most intimate friend, Dabney Carr, afterward his brother-in-law, ascended the mountain in the twilight, and in the long vacations they studied many an hour under an oak tree, their favorite of the forest. They agreed that whichever one died first, the other would have buried under this tree, and at an early age Dabney Carr was here laid to rest. Later Jefferson, his wife, two daughters, and others of his descendants were buried in the little cemetery which was formed around this oak.

It was when Jefferson was a member of the house of burgesses of Virginia, to which he was elected in 1769, that he began the erection of his residence on the summit of the world-renowned eminence, Monticello. (Jefferson changed the English name to the Italian, Monticello.) The Shadwell mansion was on a hill on the north bank of the Rivanna River, and Monticello is south, just where the stream cuts its channel through the outlying range of the Alleghanies, the Southwest Mountains. On the northeast Monticello has a steep rocky base, washed by the Rivanna, on the southwest is a dip of about one third the height of the mountain which connects it with Carter's, a higher peak. Monticello is yet covered by a dense growth of timber, mainly hardwood deciduous trees.

Before the residence on Monticello was completed, the Shadwell mansion was burned down, 1 Feb. 1770. The first building on Monticello was a brick story-and-a-half structure containing one good-sized room and some smaller rooms; it still stands as the south pavilion. Here he brought his bride in 1772. He was often absent from this beloved home, but his own manuscripts, especially his garden-book, show his love for a quiet domestic life. This same garden-book shows that in 1769 he planted a variety of fruit trees on the southeast slope of the mountain, many of them still in existence. The house was enlarged to suit the needs of the family, and in accordance with the owner's plans. From his European journeys he brought back many new ideas, so that the architecture of the house is somewhat complex. It has the appearance of an Italian villa, with a Greek portico, and considerable of the features of Colonial architecture. The Marquis de Chastellux, in a book of travels mentions a visit to Monticello in 1782, and says of Jefferson: «He is the first American who has consulted the fine arts to know how to shelter himself from the weather.» Architecture in America has advanced since that time. Some of the plans, drawn by Jefferson himself, are still in existence. The part of the home that was to last was made of good material and possessed a certain elegance, but the furniture was most simple. His last days saw the estate of Monticello so deeply in debt that it was feared he would have to end his life an exile from his beloved mountain. He sacrificed some of his estate hoping to save the residence and some land for his daughter. His friends assisted him so the estate was not lost to the Jefferson heirs until after his death; it had been his home for 56 years. The present owner keeps the mansion in good repair and there is much about it similar to the old Monticello. No debt was allowed to defame the name of Jefferson; Thomas Jefferson Randolph, the grandson, and his daughters paid every dollar of debt their eminent ancestor owed after Monticello had been sold. The great-granddaughters kept a school to assist their father in paying this debt. Consult: 'Century Magazine,' Vol. XII., p. 643, article by Nicolay, 'Monticello; Home of Jefferson'; Craighill, 'The Virginia Peerage'; Foote, 'Sketches from Old Virginia.'

Montijo, môṅ-tē-zhō, **Eugénie-Marie de.** See Eugénie, Empress of the French.

Montjoie St. Denis, môṅ-zhwä săṅ dĕn-ē, a French war cry dating from the 12th century. The name is derived from the hill near Paris on which St. Denis suffered martyrdom.

Montmagny, Charles Jacques Huault de, shärl zhäk ū-ōlt dė môṅ-män-yĕ, French colonial governor; d. France, about 1649. He was Canada's second governor-general, 1636–48, and proved himself a wise and able ruler. The condition of the colony improved under his administration, he defeated the Iroquois and concluded a treaty with them at Three Rivers in 1845; and had begun the subjugation of the Hurons when he was recalled in 1647. Under his rule the Jesuits made extensive explorations and settlements, but though deeply religious Montmagny disapproved of the founding of Montreal, considering it a weakening of the missionary forces.

Montmartre, mŏṅ-mär-tr, France, a northern district of Paris, a former suburban village, on a conical hill commanding an extensive view of the metropolis. See Paris.

Montmorency, môṅ-mō-rŏṅ-sē, **Anne,** Duc de, French soldier: b. Chantilly 15 March 1492; d. Paris 11 Nov. 1567. He was a distinguished general in the wars of Francis I., and was taken prisoner at Pavia (1525). In 1538 he was made constable of France, but by a rapid change of fortune was banished the court in 1541 under suspicion of conspiracy. He was restored by Henry II. (1547), in 1557 was defeated by the Spaniards and taken prisoner at St. Quentin, and in 1562 was again captured while commanding against the Huguenots at Dreux. In 1563 he drove the English from Havre, and in 1567 received a fatal wound in the battle against Condé at St. Denis. There is a 'Life' by Decrue (1885–9).

Montmorency, Henri, Duc de, French soldier: b. Chantilly 30 April 1595; d. Toulouse 30 Oct. 1632. In 1612 he purchased the viceroyalty of Canada from the Prince of Condé for 11,000 crowns, and was wise enough to retain Champlain in command at Quebec. He wearied, however, of the post, which gave him constant trouble, and in turn sold it. His services against the Huguenots in the civil wars were distinguished, and included a victory over the Duc de Rohan in 1628; but he took part in the insurrection of Gaston of Orleans in 1629, was made prisoner, condemned for treason, and beheaded.

Montmorency, mŏnt-mō-rĕn'sĭ (Fr. môṅ-mō-rŏṅ-sē), **Falls of,** Canada, a beautiful cascade near the mouth of the Montmorency River, on the Saint Lawrence River, 7 miles below Quebec. The river has an irregular course north and south of about 15 miles, and just above its confluence with the Saint Lawrence falls over a precipice 242 feet high, and 100 feet wide at its crest. The falls are visited by great numbers of tourists, and are utilized to supply the power necessary for the electric plants of Quebec.

Montojo, mōnt-ō'hō, **Patricio,** Spanish naval officer: b. 1833. He entered the navy when a young man, and at the outbreak of the Spanish-American war was in command of the Spanish fleet in the Pacific. This force was attacked by the American Pacific squadron under Dewey in Manila Bay 1 May 1898. Montojo's flagship, the Reina Christina, was successively engaged by the Olympia, Baltimore, Raleigh, and Boston, received 70 shots, which killed 52 men and wounded 150; and finally caught fire. Montojo transferred his flag to a gunboat. In September 1899 he was court-martialed in Madrid; urged in his defense that the fault of the defeat was the Spanish government's, as it had not given him proper equipment; and was retired without right of promotion.

Montorsoli, Fra Giovanni Angelico da, frä jō-vän'nē än-jĕl'ē-kō dä mŏn-tŏr'sō-lē, Florentine sculptor: b. Montorsoli 1507; d. Florence 1563. He was a member of the religious order known as Servites; worked at Genoa, after retiring from that order, and by building the Serra and Doria palaces and adding a chantry and Doria tomb to the church of San Mateo, established his reputation as a sculptor and architect (1525). He was soon afterward engaged as assistant by Michelangelo in his work on the Chapel of the Medici at Florence. Among his productions are the fountain in the Cathedral square at Messina (1547); he also designed several chapels in the cathedral there and built the lighthouse.

Montour, mŏn-toor', **Esther** (called «Queen Esther»), American half-breed Indian of the 18th century. She had French blood in her veins and was supposed to have been a descendant of Count de Frontenac, governor of New France. She married Eghobund, chief of the village of Sheshequin, and her keen intelligence enabled her to completely dominate the Senecas over whom she reigned as «Queen Esther.» She was friendly to a Moravian mission which was located near her village for some years, and accompanied the delegates to various congresses of the Six Nations in Philadelphia, where she was well received among the best people owing to her pleasing manners and beautiful person; but in the Wyoming massacre in July 1778 the savage in her nature asserted itself and to avenge the death of her son she deliberately tomahawked 14 prisoners. Consult Cook, 'General Sullivan's Indian Expedition' (1887).

Montpelier, mŏnt-pēl'yėr, Vt., city, capital of the State, county-seat of Washington County; on the Winooski River, and on the Central V., the Montpelier & W. R., and the Montpelier & B. R.R.'s; about 38 miles southeast of Burlington. It is situated in a beautiful valley surrounded by hills, and in an agricultural region. In the vicinity are valuable granite quarries. The chief industrial establishments are flour and lumber mills, machine shops, hardware and saddlery works, tannery, granite works, and creameries. It controls a large portion of the trade of the surrounding country, and ships considerable farm products, especially hay and potatoes, and also dairy products, poultry, granite, and lumber. One of the prominent buildings is the State capitol, a fine granite structure built in the form of a cross, the dome, 124 feet high, surmounted by a statue of Agriculture. A marble statue of Ethan Allen is at the entrance, under the portico. Another fine building is the Heaton Hospital, opened in 1896. The city has public and parish schools, the Washington County Grammar School, the Montpelier Seminary, under the auspices of the Methodist Episcopal Church, the Wood Art Gallery, the State Library, the Washington County Grammar and Montpelier Union School Library, and the seminary library. The government is administered under a charter of 1900 which provides for a mayor, who holds office one year, and a council. The mayor appoints, subject to the approval of the council, the police; and the council elects the health officer, overseers of the poor, superintendents of streets and water, and other officers. The waterworks, owned and operated by the city, were opened in 1884, and now (1903) comprise about 25 miles of mains. The water is brought from Mirror Lake, or Berlin Pond, situated about four and one half miles southeast of the city.

The land which is the town site was chartered in 1781, but the first permanent settlement was made in 1787 by people from Massachusetts. The town was organized in 1791, and in 1805 Montpelier was chosen as capital of the State. It was incorporated as a village in 1855. For 40 years it maintained town, village, and school district organizations, until 1894, when it was chartered as a city. Among the noted people who have lived in Montpelier are Admiral George Dewey and Rear-Admiral Charles E. Clark. Pop, (1900) 6,266; (1910) 7,856. Consult: Hemenway, 'Gazeteer of Vermont,' and 'History of the Town of Montpelier'; Thompson, 'History of Montpelier.'

Montpellier, môṅ-pĕl-lē-ā, France, chief town of the department of Hérault, on the Lez, six miles north of the Mediterranean, and 80 miles northwest of Marseilles. It is one of the handsomest towns of the south of France. Among its noteworthy features are the Peyrou, a splendid promenade, on which is the Château d'Eau, at the termination of a lofty double-arched aqueduct; the citadel; the cathedral; the Palais-de-Justice, the university buildings, and the Porte de Peyrou, a triumphal arch of the Doric order. Montpellier is well equipped with educational and other institutions, and since the 12th century has been famous for its school of medicine, said to have been founded by Arab physicians driven out of Spain. It is now merged in the celebrated University of Montpellier, which has also «faculties» of law, science, and literature, and an average annual attendance of 1,500 students; there is a public library of 130,000 volumes. The botanical garden, begun under Henri IV., is the oldest in France. Montpellier manufactures cottons, candles, soap, verdigris, chemicals, etc. It carries on an active trade, Cette serving as its harbor. Montpellier was a stronghold of the Huguenots, and suffered much in the religious wars. The edict of Montpellier (20 Oct. 1622) granted the free exercise of their religion to Protestants, and confirmed the Edict of Nantes. Pop. about 80,000.

Montpensier, Anne Marie Louise d'Orleans, än mä-rē loo-ēz dôr-lā-äṅ môṅ-pŏṅ-sē-ā, Duchesse de, French princess, better known as Mademoiselle or La Grande Mademoiselle: b. Paris 29 May 1627; d. there 5 April 1693. Her father was Gaston d'Orleans, Louis XIII.'s brother; and her mother was Marie de Bourbon-Montpensier, who died when her daughter was five days old, leaving her the richest princess of Europe. Her wealth, pride, and romantic disposition prompted her to a high match. In 1646 she refused the Prince of Wales, later Charles II., and her chance to marry Louis XIV. was ruined in 1652, when she sided with Condé for whose protection she had the cannon at the Bastille fired on the royal troops. Upon her return to the court in 1657 she fell in love with Lauzun, a Gascon cadet, whom Louis refused to let her marry. Lauzun was imprisoned for ten years, but Mademoiselle seems to have married him secretly, in spite of the king, only to find him a brutal husband; they were separated and her last years were spent in pious devotion. Her 'Memoirs,' covering the years 1630–88, are particularly valuable for the light they throw upon the history of the Fronde; they are edited by Chéruel (1858). Consult Varine, 'La Jeunesse de la Grande Mademoiselle 1627–52' (1901)

Montpensier, Antoine Marie Philippe Louis d'Orleans, äṅ-twän mä-rē fē-lēp loo-ē dôr-lā-äṅ, Duc de, French prince and claimant to the Spanish throne: b. Neuilly 31 July 1824;

d. San Lucar, near Seville, 4 Feb. 1890. The 5th son of King Louis Philippe, he studied at the Collège Henri IV., entered the army in 1842, served in Algiers, and in 1846 married the Spanish infanta Maria Luisa Fernanda. After the revolution of 1848 he lived in England and Holland; then settled in Spain, where he received the title of Infante and was made captain-general of the Spanish army; was suspected of a plot against the crown and was exiled from Spain, returning only after the revolution of 1868. In 1870 he quarreled with the Duke of Seville, also a claimant for the throne, and killed him in a duel. During the reign of King Amadeus (1871-3), Montpensier was exiled to the Baleares; upon his recall in 1873 he sided with Alfonso XII., and married to that prince his daughter, Maria de las Mercedes, who died without issue in 1878, the close of Montpensier's political activity. His eldest daughter married the Comte de Paris, and his only son became the husband of the Infanta Eulalia in 1886.

Montreal, Canada, the largest and most important city of the Dominion, is in the Province of Quebec. It lies on the left or north bank of the St. Lawrence, at the head of ocean navigation, 985 miles from the Atlantic, 180 miles southwest of Quebec and 420 miles north of New York.

Topography.— Montreal lies in the middle of that great plain which stretches from the Laurentians to the Adirondack Mountains and extends from the sea into the middle of the Continent. The rivers which traverse this plain, the St. Lawrence and the Ottawa, fall together at the head of the Island of Montreal, which is 42 miles long and six miles wide. The city is built upon the southeast side of this island, at a point where the Lachine Rapids make further navigation impossible. It owes its importance to this situation. Immediately behind the city Mount Royal rises to a height of 753 feet above the level of the sea. Upon three sides the mountain ends in a sheer cliff, but towards the west it extends in broken ridges for three miles. Mount Royal gives to the city its character. It was converted into a park by Frederick Law Olmstead, who succeeded admirably in bringing to light its characteristic beauties, by obeying the design which nature had already laid down. By following the terraces a roadway was constructed, devious, but always ascending until after a complete circuit the summit is reached. From the various levels and the different points of outlook a wide and diversified view is obtained. To the south, the White, Green and Adirondack mountains may be descried upon the horizon. In the middle-distance a number of rounded eminences arise from the plain, which are, like Mount Royal itself, the roots of old volcanoes. Villages, Longueuil, St. Lambert and LaPrairie, mark the southern bank of the St. Lawrence, which at this point is two miles wide. Away to the westward the valley of the Ottawa opens out, and the river, dividing on the Island of Montreal, sends its waters on either side to mingle their dark colors with the blue of the St. Lawrence. Further to the west Lake St. Louis is spread out like a sea. The Lachine canal threads the plain, and upon occasion one may see the leap and sparkle of the Rapids. To the north the Laurentians extend their dark purple irregular masses. Immediately around the mountain and upon its lower terraces lies the city.

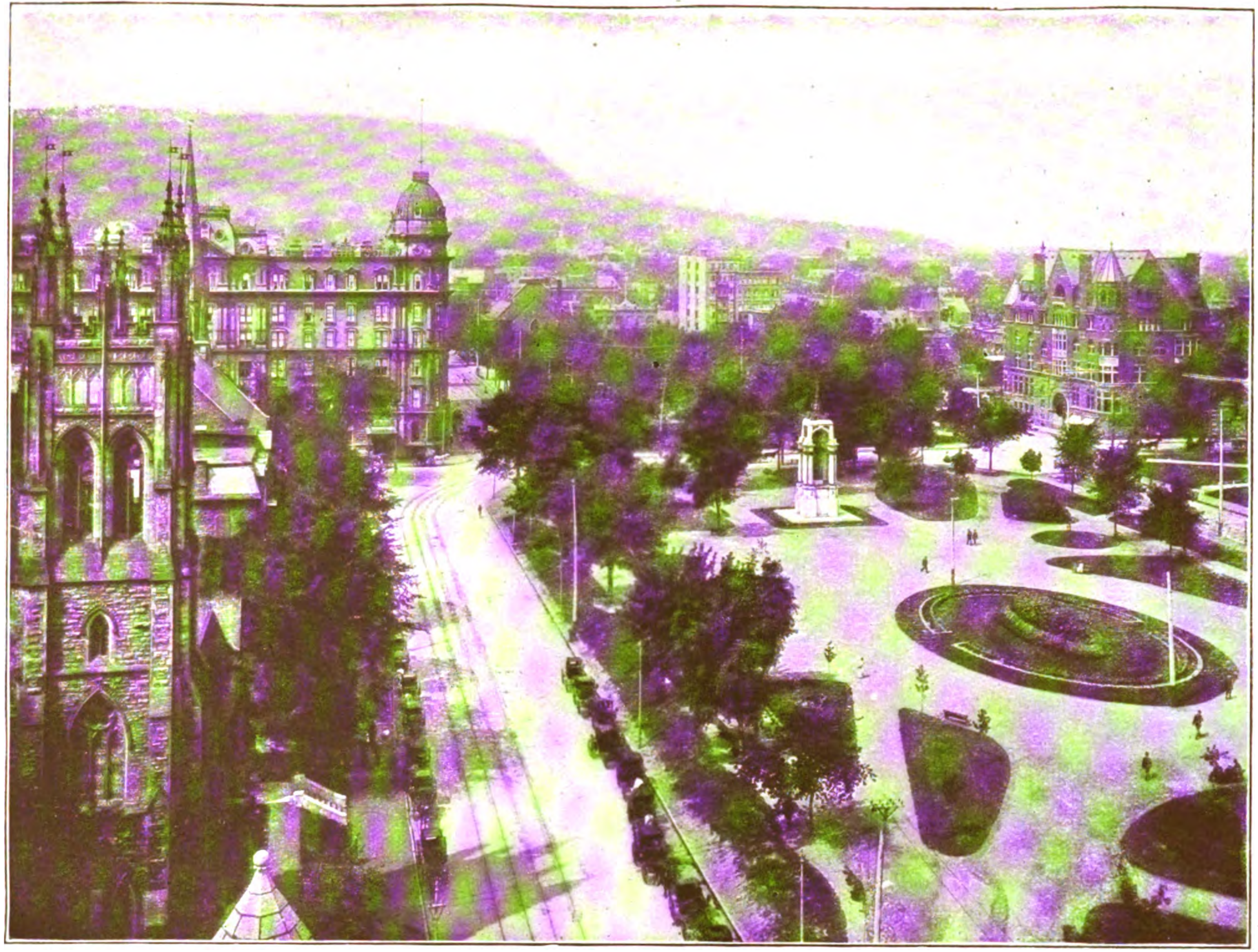
Geology.—Fourteen distinct geological formations or horizons have been described within a radius of a few miles from Montreal. Four of these belong to the quaternary or newest system; one is doubtfully but probably referable to the Devonian, one to the Silurian (Upper Silurian of Murchison), seven to the Ordovician (Lower Silurian and Cambro-Silurian of many authors), and the remainder to the Laurentian or part of the great Archæan Complex.

History.—The site of Montreal was first visited by Jacques Cartier in 1535. He landed upon the island and followed an Indian pathway: "And we, being on the road, found it as beaten as it was possible to see, in the most beautiful soil and the fairest plain; oaks as fair as there are in any forests of France, under which all the ground was covered with acorns. . . . And about a league thence, we commenced to find the lands tilled, and fair large fields full of the corn of their lands, which is like Brazil rice, as large, or more, than peas, whereof they live as we do on wheat. And in the midst of these fields is situated and fixed the said town of Hochelaga, near and adjoining a mountain which is in the neighborhood, well tilled and exceeding fertile: therefrom one sees very far. We named that mountain *Mont Royal.*"

The next European to visit the spot was Samuel de Champlain in 1611. He landed at a place which he called Place Royale, a name it still bears. He found "in the middle of the river an island about three quarters of a league in circuit, fit for the building of a good and strong town, and I named it the Isle of Saincte Heleine. The rapids come down into a sort of lake, where there are two or three islands and fine meadow-lands." By this time all trace of Hochelaga had vanished, leaving only obscure legends of a Huron Helen and of the evil which had been wrought by her.

The founding of the present city dates from 1642 and it was marked by voices and visions and dreams and signs. Its inception is shrouded in mysticism; there was Dauversière who whipped himself with a scourge of small chains; there was Olier who afterwards founded the Sulpician Seminary, to whom came a revelation as the choir was chanting *Lumen ad revelationem gentium.* These two men were miraculously brought together in the church of Notre Dame de Paris, and to them in an ecstasy the Virgin appeared. All these things are set forth in the *Relations des Jesuites.*

The proposal was to found at Montreal three communities, one of secular priests, to direct the colonists and convert the Indians; one of nuns to nurse the sick; and one to teach the Faith to children white and red alike. This was at a time when, from the condition of Indian warfare, it was like entering a kennel of wolves. The soldier captain of the expedition of forty men was Paul de Chomedy Sieur de Maisonneuve, a valiant and sober man of grave demeanor and full of courage. Accompanying the expedition was the devoted Jeanne Mance. Arriving at Quebec they encountered only jealousy and distrust. It was then the leader cried: "I have not come to deliberate but to act; it is my duty and my honour to found a



DOMINION SQUARE, MONTREAL.

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colony at Montreal, and I would go if every tree were an Iroquois.» Upon the 17th of May 1642 this strange expedition arrived at the foot of St. Mary's current. Maisonneuve sprang ashore on the spot where the Customs House now stands. In the words of the officiating priest, Pere Vimont, «tents were pitched, camp-fires were lighted, evening fell and mass was celebrated. Fire-flies caught and imprisoned in a phial upon the altar served as lights.» An altar was raised, and kneeling together the adventurers heard the voice of the priest: «You are a grain of mustard-seed that shall rise and grow till its branches over-shadow the earth. You are few but your work is the work of God. His smile is upon you and your children will fill the land.» To trace the trials and growth of the Colony would be to write the romance of Christian chivalry.

As a result of the victory which Wolfe obtained over Montcalm on the Plains of Abraham, Canada fell to the British, and Montreal formally capitulated to General Amherst on 8 Sept. 1760. When the war of the American Revolution broke out, operations were directed against Canada. Montreal yielded to Brigadier-General Wooster and General Carleton was obliged to withdraw to Quebec. During the winter of 1775-76 the Commissioners of Congress, Benjamin Franklin, Samuel Chase and Charles Carrol took counsel as to how they might detach Canada from its allegiance to the British Crown which had lasted only six years. The ecclesiastical authorities, with the astuteness of their race, took the occasion to drive a hard bargain with England, by which their religion and laws were guaranteed to them for ever. To England, Canada was, in the mocking words of Voltaire, nothing more than a few acres of snow, and the mother country adopted an easy way out of her difficulties. The Commissioners were outwitted and resorted to force. The expedition, which was sent to Quebec under General Montgomery, received no support on the way, and it was ultimately defeated and its commander slain before the barriers of Quebec.

Monuments, Parks, and Public Buildings.—Place d'Armes is a small enclosure surrounded by several noble buildings. The parish church of Notre Dame, with the Seminary of the Sulpicians, occupies the southern side. The Bank of Montreal with its classic front faces the church, and, upon either hand are large buildings for commercial purposes. The most notable feature of the Place d'Armes is the statue erected in honor of Sieur Chomedy de Maisonneuve, the founder of Montreal. He is represented in bronze, in the costume of the 17th century, holding a fleur-de-lis banner. The granite pedestal shows the inscription: «*Paul de Chomedy de Maisonneuve, Fondateur de Montreal, 1642.*» It rests upon a fountain, and displays bas-reliefs representing Maisonneuve killing the Indian chief; the founding of Ville-Marie; the death of Lambert Closse defending his enclosure near St. Lambert Hill; the heroic death of Dollard, who fell with his companions at the Long-Sault on the Ottawa, and saved the colony. At the four corners are life size bronze figures, representing an Indian, a colonist, with the legendary dog Pilote, a soldier and Jeanne Mance, all finely done by Philip Hebert, the Canadian sculptor.

Jacques Cartier Square fronts the river and is adorned with a column and statue of Lord Nelson, erected in 1808, and recently restored. Into this square the traffic from Bonsecours market overflows, and it has lost all the dignity of a public place. At the head of this square Frontenac burned four Iroquois in 1696, with good effect upon the tribe.

Victoria Square is in the centre of the city, at the foot of Beaver Hall Hill, and contains a good bronze statue of Queen Victoria, of colossal proportions, by Marshall Wood.

Dominion Square occupies the site of an old cemetery. The square is a pleasant place and acquires dignity from the buildings on either side; the Canadian Pacific Depot, the Windsor Hotel and on the east the Cathedral of St. James. Here have been erected the ice palaces when Carnival was king. Near the centre of the square is a structure containing a figure in bronze of the late Sir John A. Macdonald. The figure itself is of commanding proportions with a reasonable degree of harmony in its parts, but the canopy with its obscure adornments and trifling decorations, disguises the value of the figure.

St. Helen's Island, at the foot of the current, is a small island called by the name of Helen, wife of Champlain, the first European woman to visit Canada. The English government acquired it from the Barons of Longueuil for a military depot and station. There is yet upon the island a battery of guns and barracks. The place is prettily wooded and has many secluded spots.

Churches.—The Catholic Cathedral of St. James has an imposing situation upon Dominion Square. It is erroneously called the Cathedral of St. Peter, because it is a reproduction of St. Peter's at Rome, modified to suit the exigencies of the Canadian climate; for example, the roof is sloping to throw off the snow. This noble edifice was projected by the late Archbishop Bourget in 1852, when his church and palace on St. Denis Street were consumed in the great fire of that year. The work was commenced in 1868 and is now nearly finished. Apart from the plan the exterior is hard and gloomy in appearance. The dome is a noble adornment and a salient feature in the architecture of Montreal. Its height with the cross is 250 feet, and its diameter 90 feet. The plan is cruciform after the manner of its prototype the tribune and ends of the transept being rounded. The total length is 330 feet, the breadth of the transept 225 feet, the height to the roof tree 80 feet. The interior is upon the model of the Italian churches. At the north entrance is a statue to the founder by Hebert.

The parish church of Notre Dame faces the Place d'Armes. It is a plain stately edifice of late Gothic style, built of grey-stone in 1824, by James O'Donnell. The present site was occupied by a church built in 1672, a long low structure with a pointed roof. Notre Dame is one of the largest churches in America, being 255 feet long and 134 feet wide, and capable of containing 15,000 persons. There are two towers, 227 feet high, provided with an elevator, and from the summit a notable view may be obtained. They contain a chime of ten bells which are rung upon special occasions. There are three others, one "le Gros Bourdon," the largest bell in America, weighing 15 tons. The interior is florid and tasteless in its decorations, but the wood carving is good. The organ was built at St. Hyacinthe in 1890. Behind the choir is a richly adorned Lady Chapel.

Adjoining the church is the seminary of St. Sulpice, erected in 1710 and now used for the offices of the Order. As in the days of Charlevoix, it is "a stately great and pleasant house, built of free-stone, after the model of that of St. Sulpice at Paris; and the altar stands by itself, just like that at Paris."

Notre-Dame-de-Lourdes, on St. Catherine Street, is the only church in Canada in which all the interior decoration is meant to illustrate one central idea; in this case, the dogma of the Immaculate Conception. M. Bourassa, the artist, was stimulated to this effect by the declaration in 1854, of Pius IX., that this dogma was of faith. The style of architecture is Byzantine and Renaissance in harmonious proportions. Within and without the effect is one of unity and force.

Notre-Dame-de-Bonsecours dates from 1673, when it was founded by Marguerite Bourgeois. The present edifice dates from 1771, and several times was in danger of being swept away by the tide of commerce at its base. It has been sorely mishandled by the renovator.

The Church of the Gesu, on Bleury Street, with St. Mary's College adjoining, is the abode of the Jesuits. They returned to Canada in 1847, and erected the present church in 1864. Members of this order were the first to establish missions in Canada and an account of their trials affords the most romantic reading of its history. Individual priests penetrated the wilderness and lived and died often in hideous torment amongst the savages of the Iroquois confederacy. At the time of the conquest they were expelled from Canada, and their estates confiscated. Up to 1892 their revenues were devoted to educational purposes when, under arrangements their estates were restored to the Order. The church is 194 feet long, 96 feet wide, the transept 144 feet, and the nave 95 feet high. The frescoes are in grisaille, greyish tints imitative of bas-reliefs, a very effective decoration for the interior. The evening music is very fine and an admirable sermon in English is often preached which attracts many non-adherents of the Roman communion.

Amongst the churches of Montreal the Anglican Christ Church Cathedral holds first place in correctness of style. The style chosen is early English. The architect has insisted very clearly upon its proportion and symmetry, and has succeeded in erecting one of the most important architectural units in America. Its conception is due to Bishop Fulford, the first resident bishop of Montreal, and his memorial on the east side is much admired. It resembles the Martyr's Memorial at Oxford. The church is in the form of a Latin cross. The total length is 212 feet, transept 100 feet, height of spire 224 feet, nave 67 feet. The material of which it is built is Montreal limestone faced with Caen sandstone, which, though soft for the climate, has weathered to a very delicate tone of color. There is no attempt at interior decoration, except in the staining of the glass, which is well done, especially the northern windows and those of the transept. Other features are the seats of the choir, and the capitals of the columns carved to imitate Canadian flowering plants. The chapter-house, an octagonal building with broken outlines, adds to the general effect. In spite of, or perhaps by reason of, the correctness of the design and the adherence to it, the edifice somehow lacks the true cathedral feeling.

St. George's Church, Anglican, on Dominion Square, is a very dainty piece of building, after the manner of the 13th century Gothic. One notes the following features: the stone porch, the spire 230 feet high, with a fine chime of bells, the wide span of the roof, and the freedom of the nave from pillars. The church was erected in 1870, of limestone and olive sandstone.

The Church of St. James the Apostle, on St. Catherine Street West, is a pleasing little edifice. It contains a chime of six bells which ring with good effect. One admires the pulpit of Egyptian marble and Caen sandstone, and the stalls of carved butterwood.

The principal Presbyterian churches are St. Andrew's (Church of Scotland) on Beaver Hall Hill; St. Paul's, Knox, American, and Crescent on Dorchester Street; and, most important, Erskine Church, on Sherbrooke Street.

St. James is the chief of the Methodist churches. It is situated on St. Catherine Street; it is elaborate in design and within the arrangement is of a very modern kind.

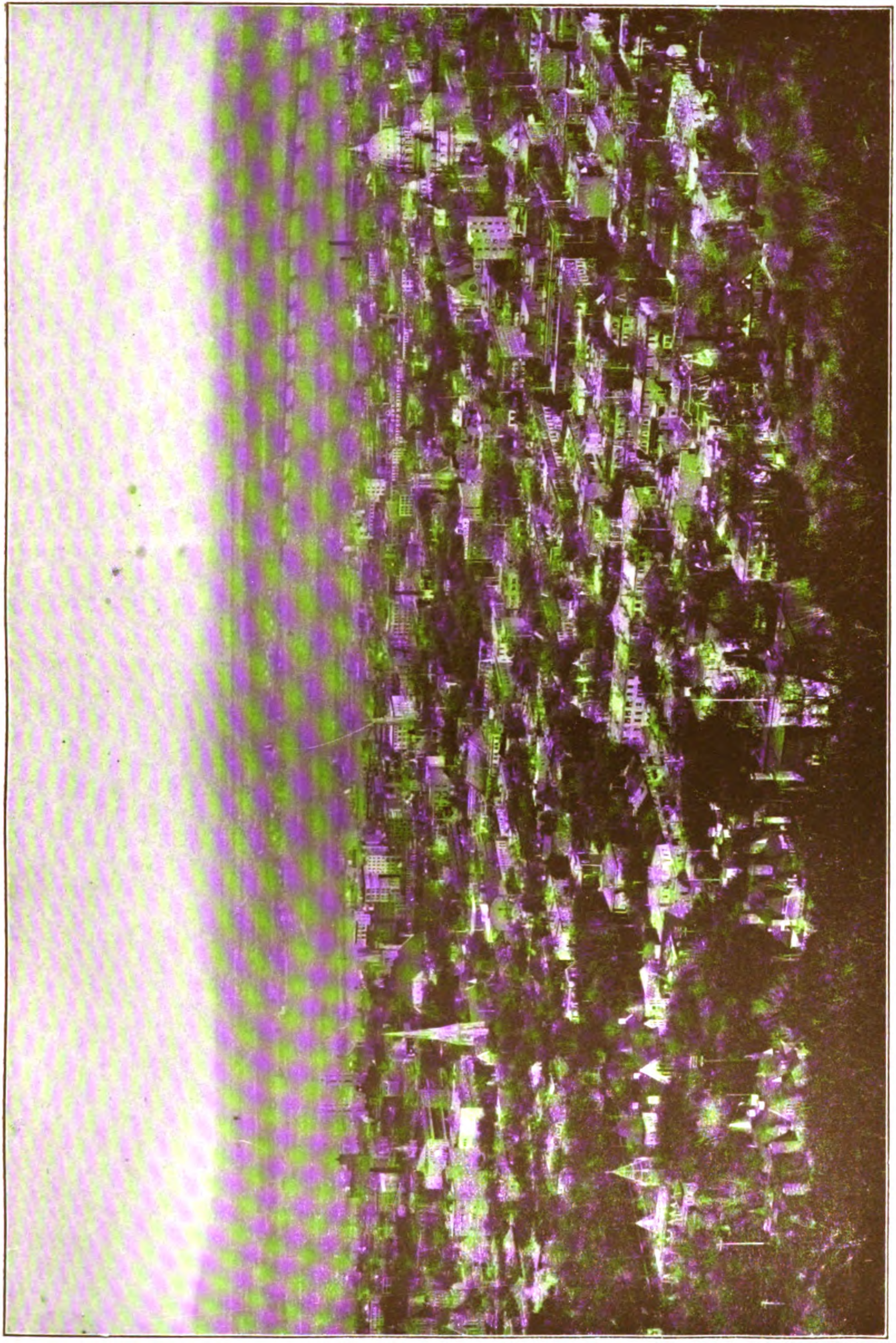
Educational Institutions.— McGill University, non-denominational, was founded in 1821, when James McGill, a native of Glasgow, born 1744, died 1813, under a will dated 1811 bequeathed £30,000 to the Royal Institution for the Advancement of Learning. This corporate body dates from 1801 and it secured a new charter in 1821, but it was not till 1829 that educational work was undertaken. McGill University contains four faculties, Arts, Law, Medicine, and Applied Science, the Royal Victoria College for Women and a Conservatorium of Music.

During the present session, 1904–5, the students in arts number 297, law 28, medicine 370, applied science 370. The number of instructors is 170. The total value of the equipment is placed at $2,137,680, and the endowment at $2,300,172.

The university library, a fine Romanesque building, erected in 1893, contains 97,000 volumes. It is particularly strong in History. The museum, erected in 1882, is rich in geological collections. The observatory is the centre of much valuable work in astronomy. Connected with the university are the Presbyterian, Wesleyan, Anglican, Diocesan, and Congregational colleges. There is also in Montreal the Medical Faculty of Bishop's College, Lennoxville, with 43 students.

Laval University was founded in 1852 by the Quebec Seminary, which itself was founded in 1663 by Mgr. de Laval Montmorency, the first bishop of Quebec. Laval operates under a royal charter signed at Westminster 8 Dec. 1852, and under the bull, *Inter Varias Sollicitudines,* promulgated by the Sovereign Pontiff Pius IX., 15 April 1876. In conformity with the decision of the Propaganda a branch of Laval University was established in Montreal in 1877, enjoying all the privileges of the mother university at Quebec. A new building which is a modern

MONTREAL, CANADA



City of Montreal from Mount Royal

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adaptation of the Renaissance was erected on St. Denis Street out of the large funds of the seminary. The first floor is occupied by the law faculty, the second by the faculty of medicine. This faculty was formed by an amalgamation in 1891 with the Montreal School of Medicine and Surgery, which had existed since 1843. It is attended by 300 students.

The Seminary of St. Sulpice undertakes the theological teaching for the Montreal branch of Laval University, and a portion of the work in arts. Its buildings extend from Sherbrooke Street up the slope of the mountain and include the grand seminary and the Seminary of Philosophy. There are more than 600 students in residence with 40 professors. Two towers, the remains of the fort constructed in 1671, still stand in front of the seminary.

St. Mary's College is conducted by the Jesuits and adjoins the Church of the Gesu on Bleury Street. Here 1,200 students are assembled and receive an excellent training in classics.

The Sisters of the Congregation of Notre Dame was established in 1653. These ladies have 91 educational establishments in Canada and the United States with a thousand nuns and over thirty thousand pupils. The mother house, Villa Maria, was burned in 1895, but it is now being replaced on a new site.

The Sisters of the Holy Names of Jesus and Mary inhabit the Hochelaga Convent for a mother house. They have thirty-six minor houses in which 10,000 children are taught.

Hospitals.— The Hotel Dieu, 275 beds, founded in 1643, occupies a pile of buildings erected in 1859. During the Iroquois wars and ever since this hospital has done good service. It is attended by the surgeons of Laval.

The Montreal General Hospital was founded in 1819, and opened in 1822. During the year 1903 indoor patients to the number of 3,066 were treated; in the outdoor department there were 35,984 consultations. There were 238 deaths, a mortality of 7.7 per cent. The ordinary expenditure was $105,453.

The Royal Victoria Hospital was founded, erected and endowed between 1888 and 1893 by Lord Strathcona and Mount Royal and Baron Mount-Stephen. In 1903 there were admitted 2,931 patients, and 23,638 consultations were given in the outdoor department. There were 142 deaths, a mortality of 4.88 per cent. The ordinary expenditure was $120,419. The cost per patient per day was $1.61, and the total number of hospital days, 74,835.

Other hospitals are the Notre Dame with 125 beds, which is now erecting new buildings with accommodation for contagious cases, the Western General Hospital with 40 beds, and the enormous hospital of the *Soeurs Grises* for foundlings and the aged infirm. The «Alexandra Hospital» for contagious diseases is being erected by the Protestant community at a cost of $200,000.

Other public buildings are: the City-hall, an imitation of the Hotel de Ville in Paris; the Court-house, in a classical style with a dome; the Art Gallery, with some good pictures but not equalling those held in private collections; the Fraser Public Library with 30,000 volumes; the Canadian Pacific Railway Station, a fine castellated structure. Many of the private residences are fine, and the general material of construction being gray limestone gives to the city an appearance of dignity.

Navigation and Trade.— Montreal stands at the head of ocean navigation and a channel of at least 30 feet in depth extends to the sea. Twenty-nine per cent of the exports of Canada, and 32 per cent of the imports come through Montreal. As a grain-shipping port, Montreal, during the season of 1903, ranked third on the continent, its exports of grain being exceeded only by those of New York and New Orleans. Large new docks, elevators and freight sheds are now under construction at a cost of $8,000,000. In 1903 navigation opened on the 12th of April and closed on 28 November. The number of sea-going vessels was 802 with a tonnage of 1,890,904. The inland vessels numbered 15,338 with a tonnage of 2,415,791. The exports included 25,497,707 bushels of grain, 2,389,848 boxes of cheese, 225,486,695 feet of lumber, and 147,216 cattle. The value of the merchandise entered for export was $70,937,510, and for import $78,527,078. The customs dues were $12,538,189.

Montreal is the banking centre for Canada. There are 34 banks in Canada, many of which have their head offices in Montreal and nearly all have branches. On the 31st of August 1904 these banks had on deposit $467,697,996. The total capital was $100,546,666; the reserve $52,320,981 and the notes in circulation $60,227,074. The total clearing of the banks in Montreal for the year 1903 was $1,113,978,000. The highest for one day, 12 June, being $7,008,196.

The Grand Trunk Railway with a mileage of 4,177 miles, and the Canadian Pacific, with 10,158 miles, have their headquarters in Montreal with general offices and large works. Two bridges span the St. Lawrence. The Victoria Bridge, 1¾ miles long, tubular, costing $6,300,000, was designed by Robert Stephenson, and the work was inaugurated by the Prince of Wales in 1860. It was long regarded as one of the engineering feats of the world, but in 1898 it was converted into a structure more suitable for modern needs with two tracks, a driveway, and foot-path. The Canadian Pacific railway bridge, light and graceful, crosses the river at Lachine. It is built on the cantilever principle, and has two spans each 408 feet long.

The population of Montreal, according to the census of 1901 was 266,826. Including residents in the suburbs, it is now estimated at 373,000, of which 225,000 are French. There are approximately 50,000 dwellings.

The civic income in 1903 was $3,554,428. Interest charges required $1,089,531; schools $355,000, and the general administration $2,401,843. In addition there was a water tax amounting to $707,694. The water service is expensive and antiquated and the insurance rates are high in consequence. The assessment of property for 1904–05 amounts to $206,856,475 and the revenue is derived from a rate of 1 per cent, with two fifths of 1 per cent for Protestant school purposes, ¼ per cent only is paid by Catholics for their schools.

The public schools are controlled by boards of commissioners, one for Catholics and one for Protestants. These are elected by the legislature and the city council. The schools are in the main effective, though the commissioners are chiefly clergymen, and education is free.

Civic affairs are controlled by a board of 36 aldermen and mayor. These are elected every two years by vote of all tax-payers and arrange themselves into various committees.

The weather of Montreal is cold in winter, and pleasantly warm in summer. In 1903 the greatest cold was 20° below zero, and the greatest heat was 88° on 9 July; the warmest day was 10 July, when the mean was 79.7°. The mean temperature for that month was 67.72 and for the year 43.07°. For 29 years the mean temperature was 42.09°. During the year 1903 the percentage possible of sunshine was 41.7; the rainfall 24.88 inches; the snowfall 112.7 inches. Snow fell on 89 days and rain on 125 days. The first sleighing of the winter was on 6 December.

Andrew Macphail.

Montres′or, Frances Fredrica, English novelist: b. near Walmer, Kent. She is a daughter of Admiral Montresor, and among her books, which have had a vogue in this country as well as in England, are: ‘Into the Highways and Hedges’ (1895); ‘The One Who Looked On’ (1895); ‘Worth While’ (1896); ‘False Coin or True’ (1896); ‘At the Cross Roads’ (1897); ‘The Alien’ (1901).

Montrose, mŏn-trōz′, **James Graham,** Marquis of, Scotch royalist general: b. 1612; d. Edinburgh 21 May 1650. He was son of the Earl of Montrose, whom he succeeded in that title in 1626. He was educated at St. Andrew's; joined the opposition to Charles I.'s attempt to introduce episcopacy into Scotland in 1637, becoming one of the leaders of the Covenant; but soon made peace with the king in the hope that neither Episcopacy nor Presbyterianism would be given sole power in Scotland, but that the crown and the nobles might rule. This programme, however, was opposed by Argyll, who had Montrose imprisoned in Edinburgh Castle in 1641. On the beginning of the Civil War Montrose repeated the offer of his services to Charles; they were accepted in 1644, when with only 1,000 men he invaded Scotland, and, after being deserted by practically all his followers, planned a rising of the Highland clans. These he united by their common hatred of Argyll, and with them he won several victories, only to be crushed at Philiphaugh (12 September) by David Leslie. Montrose escaped to Norway. In 1649 he succeeded in urging the younger Charles to send him again to Scotland; but the clans would not rise. He was captured, taken to Edinburgh, and there drawn and quartered. His loyalty to the Stuart cause is only less remarkable than his own scheme of Scottish independence of ecclesiastical control, an ideal to which he always remained faithful. Montrose was a political poet, whose verse is vigorous. As a general he ranks first among the Scottish royalists. Consult: Napier, ‘Montrose and the Covenanters’ (1838), and Gardiner, ‘The Great Civil War,’ Vol. II., which is particularly able in its criticism of Montrose's strategy.

Montrose, Colo., town, county-seat of Montrose County; on the Uncompahgre River, and on two branches of the Denver & Rio Grande railroad; about 355 miles southwest of Denver. It is in the Uncompahgre Valley, in which there is a large acreage of fertile soil, which is made productive by irrigation. The chief products are fruit, grains, and vegetables. Considerable attention is given to stock-raising. Pop. (1910) 3,254.

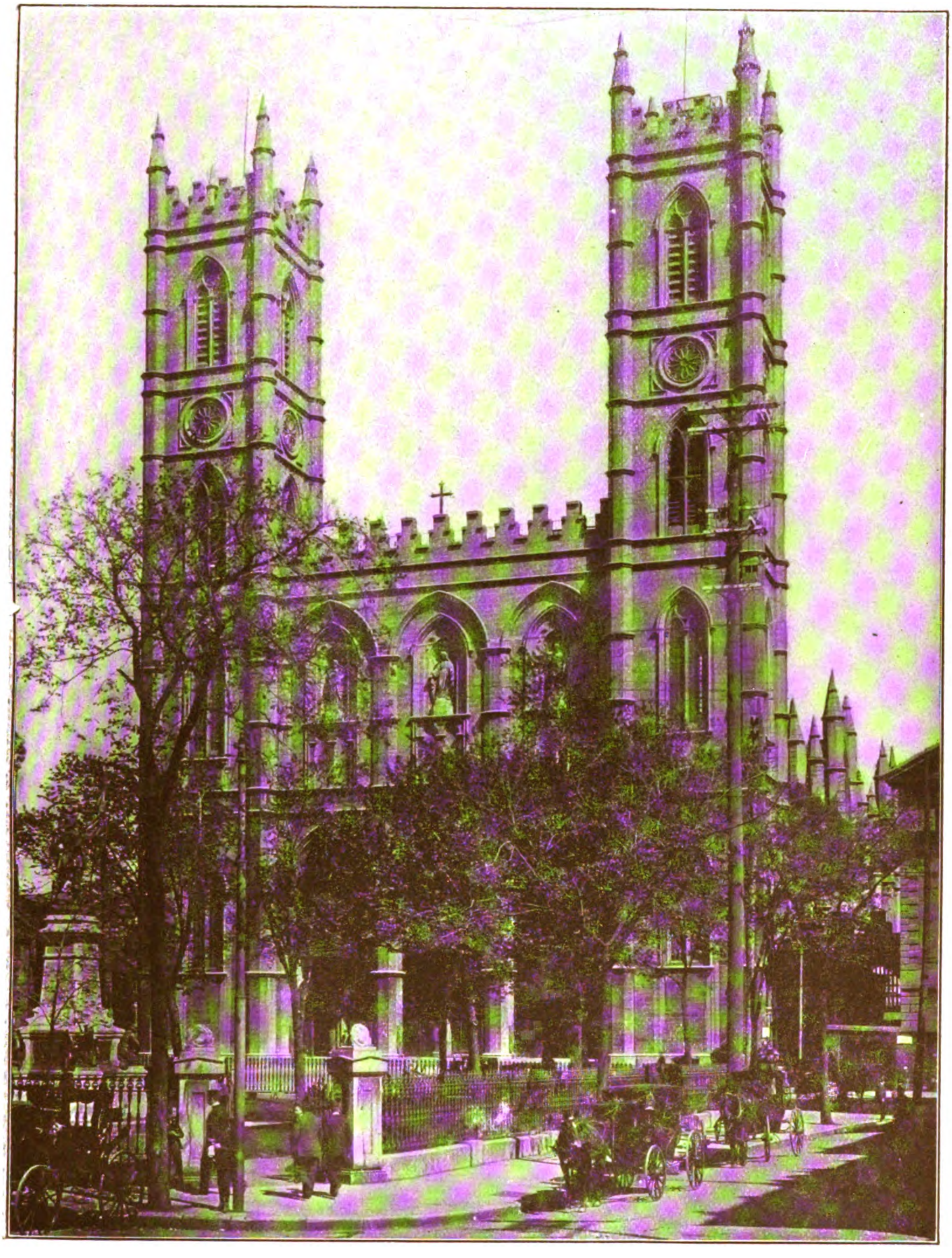
Montrose, Pa., borough, county-seat of Susquehanna County; on the Montrose, the Lehigh V., and the Delaware, L. & W. R.R.'s; about 40 miles north by west of Scranton. It is about 2,000 feet above the sea, and its cool climate in summer and the beauty of its scenery make it a favorite summer resort. The manufactories are machine shops, lumber mills, flour mills, and creameries. Pop. (1890) 1,735; (1900) 1,827; (1910) 1,914.

Montrose, Scotland, a seaport town and royal burgh in Forfarshire, 80 miles northeast of Edinburgh, at the mouth of the South Esk, which widens out into a shallow expanse behind the town, known as Montrose Basin. The river is crossed by a suspension bridge, and by a railway bridge. Between the town and the sea are extensive "links." Montrose is well built and has the usual public buildings and institutions, including two public libraries (one with 19,000 vols.) and one of the largest parish churches in Scotland. The principal employment is flax-spinning, employing about 2,000 hands. Ship-building is also carried on, and there are extensive saw-mills. The foreign trade, which is largely in timber, flax, etc., is chiefly with the Baltic and Canada. Montrose is also the centre of a fishery-district. It dates prior to the 12th century and is one of the Montrose district of burghs, which includes Arbroath, Brechin, Forfar, and Bervie. Pop. about 13,000.

Monts, Pierre du Guast, pē-ăr dü gä môṅ, French colonist in North America: b. Saintonge, France, about 1560; d. Paris 1611. He was of an Italian family and educated in the Roman Catholic faith, but became a Protestant and a member of the court of Henry IV., who in 1603 appointed him lieutenant-general with viceregal authority of a company of colonists to whom Acadia had been granted. He sailed from Havre in 1604 with Samuel Champlain and the colonists, and after exploring the Bay of Fundy discovered Annapolis harbor and then explored and named St. John River. He established a colony at St. Croix and at Port Royal and then returned to France, but received no recognition of his services. At his own expense he sent relief to his colonists and assisted Champlain and Pontgrave to make a voyage to the St. Lawrence in 1607; and Quebec was founded by explorers aided by him in 1608. He lost favor at court upon the death of Henry IV., and died a year later. Consult Parkman, ‘Pioneers of the New World’ (1865).

Montserrat, mŏnt-sĕr-rät′, Spain, a mountain in the province of Catalonia, 24 miles southwest of Barcelona, famous for its ancient Benedictine monastery, composed, in part, of 13 hermitages, accessible only by steps hewn out of the steep rock, and founded by Sifredo el Vellaso, count of Barcelona, on the spot where a miracle-working image of the Virgin Mary was found in the 9th century. It was enlarged and richly endowed by Philip II. Learned Benedictines had established themselves here as early as 976; and they and their successors formed a large library, which was destroyed when the monastery was pillaged by the French and partly destroyed in 1811. After the restoration of Fer-

MONTREAL, CANADA.



Notre Dame Church

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dinand VII. the rebuilding of the monastery was begun, but was stopped again when the monks were expelled by the Carlists in 1827. The monastery has fallen more and more into decay since the abolition of the order to which it belonged. While living in this monastery Ignatius of Loyola (q.v.) conceived the idea of founding the order of Jesuits.

Montserrat, mŏnt-sĕ-răt', West Indies, a British island of the Leeward group, almost at the same distance (about 30 miles) from the islands of Nevis, Antigua, and Guadeloupe. It is 32 square miles in extent, nearly two thirds of which is mountainous and barren. Its culminating point is the Souffrière, a volcano 3,000 feet high. The climate is on the whole healthful. The principal exports are sugar, molasses, tamarinds, and lime-juice; and the principal imports, cottons and clothing materials, hardware and other manufactures. The exports and imports are usually from £25,000 to £30,000 each annually. The government of the island is vested in the governor-in-chief of the Leeward Islands, who is represented by a president, assisted by a council and house of assembly. Plymouth, the capital, is on the southwest side of the island. The island was discovered by Columbus, and was colonized by the British in 1632. It was twice in the hands of the French, but since 1783 has been uninterruptedly possessed by the British. Pop. about 13,000, of whom not more than 200 are whites.

Montt, mŏnt, **Jorge,** Chilean sailor and politician: b. Santiago, Chile, 1846. He was a son of the Chilean statesman Manuel Montt (q.v.) and early entered the navy, where he had gained the rank of captain when in 1890 an uprising against President Balmaceda was threatened. When the revolution broke out in 1891 Montt was given command of the naval and land forces subject to the control of Congress, and after the suicide of President Balmaceda was appointed provisional president and in November 1891 was elected to the office.

Montt, Manuel, Chilean statesman: b. Petorca, Chile, 5 Sept. 1809; d. Santiago, Chile, 20 Sept. 1880. He was graduated from the National Institute in Santiago and was engaged as instructor there until he entered upon his political career. As assistant secretary of state he sternly suppressed the revolt of 1837, and in 1838 was made a judge of the supreme court. His election to the chamber of deputies followed and he was for a time president of that body. He was minister of justice 1841–5 and of the interior 1846–8, was elected president in 1851 and under his firm, conservative policy a succession of revolts were crushed and many industrial improvements were introduced. After the expiration of his second term he resigned his office to his successor and assumed the presidency of the supreme court. He was president of the American congress which met in Lima in 1865.

Montyon (môn-tē-ôn) **Prizes,** rewards from a fund left in charge of the French Academy by Jean Baptiste Robert Auger, Baron de Montyon (b. 1733; d. 1820), a French economist and philanthropist, and a friend of Franklin. He founded in his lifetime six prizes, of which two, that for useful discoveries in the arts, and that for valuable medical discoveries, lapsed after his death. The others are: (1) a prize, founded in 1782, granted annually to the author of a literary work adjudged the most beneficial to the temporal good of mankind; (2) founded in the same year, for the most important discovery making more healthful the occupations of workingmen; (3), founded in 1783, to promote mechanical research; and (4) a prize, first given in 1783, for the most remarkable virtuous act on the part of any poor French citizen. For each of these prizes he left a capital fund of 10,000 francs ($2,000).

Monumen'ta Germa'niæ Histor'ica, a great historical work dealing with the monuments and antiquities of Germany, the first volume of which was published in 1826. It was begun in 1819, and later was placed under the direction of the Prussian Academy of Sciences. In 1902 upward of 70 volumes had been issued.

Monuments. The term monument is applied to structures which are characteristic or remarkable on account of their being erected as memorials, and also, though loosely, to those buildings which express some form of worship, or have peculiar prominence on account of their beauty, proportion, or grandeur. In modern times, churches are often erected as memorials to individuals, and yet the term monument is not applied to them except in the vague general sense named above. It is evident, therefore, that such buildings may be commemorative monuments, as well as columns or tombs. Sepulchral monuments are the memorials most commonly erected. In Egypt, pyramids are monumental on account of their size, showing very little of so-called architectural art. There are about 100 of these, each containing a room which was used as a royal sepulchre. The Great Pyramid built by Khu-fu, called by the Greeks, Cheops, about 950 B.C., measures 764 feet square at its base, and is 482 feet high. As Saint Peter's, at Rome, is about 15 feet less in height, it could be covered by the shell of this pyramid. In Assyria and Chaldæa there are few temples and no tombs remaining of sufficient architectural importance to be classed as monuments. Important buildings in these countries were placed on huge mounds or terraces of earth, which raised them above the surrounding country, but as these structures were mainly of unburned bricks, they have fallen into shapeless mounds.

The earliest existing Greek monuments are found at Mycenæ and Tiryns. The Lion Gate at Mycenæ shows two large lions rampant on each side of a column, carved in bas-relief above the lintel; and this sculpture is wholly monumental in character, related both to religious and dynastic associations. The gateway at Mycenæ is one of the earliest of porches or towers of entrance which were among the chief monuments of Greek art: these were the Propylæa of which the most important was that of the Acropolis of Athens, with the small Ionic temple of Nike Apteros close by. The choragic monument erected by Lysicrates to commemorate his choral victory may still be seen at Athens. This was built at the time of Alexander's conquest, when Athens was declining and Asia Minor was being filled with magnificent temples of the Corinthian order. Other choragic monuments still exist at Athens in a partly ruined condition. The Tower of Winds, or Clepsydra of Andronicus, was erected at Athens about 100 B.C., but this was rather a utilitarian structure, as it served as a measure of time. Other Greek monuments were the Arch of Hadrian, of the later Roman period; entrances to other temple sites, similar to the Propylæa of the Acropolis, as that of Eleusis; theatres, colonnades, stadia, and gymnasia. Greek tombs that remain at the present time are nearly all to be found in Asia Minor, the best known being the Mausoleum at Halicarnassus. The small Greek monuments and tombstones are very simple and refined in detail. Of the same epoch are the rock-cut tombs of Asia Minor. Some of these are of great beauty, the exterior face of the living rock having been smoothed and made vertical, and adorned with magnificent bas-reliefs of very large size.

The principal Roman monuments were on a large scale, the rough work being executed by cheap labor, soldiers, barbarians, or slaves. The Roman Forum was crowded with temples, arches, and individual memorials. Arches were characteristic products of Roman civilization, and were generally erected in honor of some victorious general or in commemoration of some great event. (See ARCH, MEMORIAL AND TRIUMPHAL.)

Columns were also frequently erected. The column of Trajan is still standing in Rome. It is 133 feet high, and has a spiral line of figures in relief from the foot to the top of the shaft, showing the story of one of Trajan's campaigns. There is a staircase within the column leading to the top. The sepulchral monuments of the Romans were generally small. One of the larger ones was the circular tomb of Hadrian, now the castle of San Angelo. Small sepulchral monuments lined the sides of Roman roads for miles outside the city. Many have been found at Pompeii. The tomb of Cæcilia Metella, a characteristic example, was built by Crassus, about 60 B.C. It was circular in plan, with a square base.

Early Christian architecture, developing after the fall of Rome, used or copied Roman buildings. At Ravenna interesting monuments of this period were the tomb of Galla Placidia, built in the middle of the 5th century, and the tomb of Theodoric, erected early in the 6th century, a two-storied structure, roofed by a single stone 36 feet in diameter. Basilicas commemorating scenes in the life of Christ were erected as early as the 4th century in Syria, at Bethlehem, at the sepulchre near Jerusalem, and on the site of the temple.

The principal monumental buildings of the Byzantine period were in Syria, where from the 4th to the 8th century what we call Syrian architecture was in full luxuriance. The noble tombs of cut stone are, together with the churches and villas built of the same material, rather Græco-Syrian than strictly Byzantine in construction and design. Romanesque architecture in western Europe has not left us many monuments of great size and importance, but some tombs of great beauty remain in the churches of England, France, and Germany.

Prominent monuments of the Gothic period were erected in the cathedrals at Paris, Chartres, Rouen, Amiens, Rheims, and in the Sainte Chapelle, Paris. In England, early English Gothic is well shown in the crowd of altar-tombs, some of them with canopies, which are found in the churches, especially in Westminster Abbey. Memorial chapels were also built of great richness and splendor. A good example of the decorative period is to be found in Henry VII.'s chapel at Westminster. Italian Gothic monuments include many of the wall-tombs in the cathedrals at Florence, Sienna, and Milan.

The Renaissance is represented by the Florentine wall-tombs of Santa Croce and the Venetian ones of the churches of Saints Giovanni e Paolo, the Frari, and many others. The principal monument of Saracenic architecture in India is the Taj Mahal in India, built in the middle of the 16th century, but the tomb-mosques of the caliphs near Cairo are equally fine as architecture, however inferior in cost and splendor.

In the 19th century, a list of monuments should certainly include the triumphal arches of the French empire, the arch of the Carrousel, and the Arc de l'Etoile, the Pantheon, the Madeleine, the Colonne Juillet; in America, the tomb of General Grant in New York, the many Lincoln and Washington monuments in different cities, and a host of statues, some equestrian, for which see SCULPTURE.

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FRANK A. BOURNE,
Architect, Boston, Mass.

Monumentum Ancyranum, an inscription on the marble walls of the temple of Augustus at Ancyra (modern Angora) in Galatia. It is a transcript in both Greek and Latin of the emperor's own account of his reign, which he had ordered in his will to be set up on bronze tablets before his mausoleum in Rome. Though in fragmentary condition, it is of high historical value.

Monvel, Louis Maurice Boutet de, loo-ē mō-rēs boo-tā dē môn-vĕl, French painter and illustrator: b. Orleans 1850. He studied with Rudder, Cabanal, and Carolus Duran, with the last, after some work in the Atelier Julien. His first picture exhibited in the Salon appeared in 1874. He prefers the decorative to the realistic effect in color and modeling. The illustrations which he made for the 'Life of Jeanne d'Arc' (1897) in the 'Century Magazine' are supremely successful both in line and color. In the Memorial Church at Domrémy he has painted six panels illustrating the career of La Pucelle. Among his best known pictures is 'The Apotheosis' (1885), and his portraits are famous.

Monza, mōn'zä, Italy, a town of Lombardy, in the province of Milan, 11 miles by rail northeast of Milan, on the Lambro. The town is of great antiquity, and has a quiet, venerable air. The most remarkable edifice is the cathedral of St. John the Baptist, originally founded at the end of the 6th century by the celebrated Lombard queen, Theodelinde, but subsequently renovated and enlarged. It contains the ancient iron crown of Lombardy, restored to the Italians by Austria in October 1866, as well as various other relics and some valuable art treasures. There is also an old imperial palace surrounded by a large and well-laid-out park. Here, while on a visit, King Humbert of Italy was assassinated 29 July 1900. There are manufactures of silk, hats, leather, bricks, tiles, and sausages, for which the town has long been famous. Pop. about 46,000.

Mon'zonite, an augite variety of syenite (q.v.).

Moo'dy, Dwight Lyman, American evangelist: b. Northfield, Mass., 5 Feb. 1837; d. there 22 Dec. 1899. He worked for a time on a farm, then went to Boston as a salesman in a shoe store, and while there became a member of a Congregational church. He later obtained a position in a shoe store in Chicago, and there began his active religious work in the Sunday school by forming a class of poor boys; from this beginning he built up a large Sunday school, and after 1860 devoted himself entirely to religious work. During the Civil War he worked among the soldiers, in the employ of the Christian Commission, and at the close of the War resumed his mission work in Chicago, becoming president of the Young Men's Christian Association in 1865. A large church was built for his work, of which he became pastor, though never regularly ordained. In 1870 he was joined by Ira D. Sankey, the singer, and in 1873 the two visited England and Scotland, doing evangelistic work. On their return large meetings were held in New York, Brooklyn, and Philadelphia, and subsequently in many cities throughout the United States, at which it is estimated Mr. Moody addressed over 50,000,000 people. Without abandoning entirely his evangelistic tours, he made Northfield his headquarters and established there a girls' academy (1879) and a training school for religious workers, and at Mount Hermon a boys' academy. Later he founded a school for Bible study in Chicago; and inaugurated the custom of holding, at Northfield, summer conferences of college students and missionary volunteers, and the annual meetings of the Young Men's and Young Women's Christian associations. He also established systematic preaching and distribution of religious literature among inmates of the prisons; and built up at Chicago and Northfield establishments for the publishing of inexpensive religious books, tracts, etc. His marked executive ability won him the confidence of men of wealth, who gave generously to his enterprises. Though a Bible student, he was not a theologian and did not understand the methods of Higher Criticism; he was primarily a preacher of the Word of God as he believed it. The power of his preaching was due to his strong personality, his simplicity of thought and language, and his thorough sincerity and earnestness. He published: ‹How to Study the Bible›; ‹Men of the Bible›; ‹Weighed and Wanting›; ‹Arrows and Anecdotes› (1877); ‹The Way and the Word› (1877); ‹Heaven› (1880); ‹Secret Power› (1881); ‹The Way to God› (1884); and ‹Bible Characters› (1888).

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Moody, Helen Watterson, American author: b. Cleveland, Ohio. She was graduated from the University of Wooster, Ohio, in 1883, and was instructor in English and Latin there in 1883–7, when she became a member of the editorial staff of the New York *Sun*. She was married to W. S. Moody, a New York journalist, in 1891. She has published: ‹The Unquiet Sex› (1898); ‹A Child's Letters to Her Husband› (1903); etc.

Moody, James, American soldier: b. New Jersey 1744; d. Sissibon, Nova Scotia, 3 April 1809. He was a New Jersey farmer at the outbreak of the American Revolution, but with 73 of his neighbors joined the British forces and was active in attacks upon his former friends. He was daring and unscrupulous in his movements, and succeeded, in 1781, in seizing important despatches of Washington's. Though unsuccessful in many instances, his knowledge of the country enabled him to make his escape after his expeditions as a spy, and his name was regarded with fear in the region in which he worked. He retired to Canada after the war, where he was presented with an estate and received half-pay as colonel of the militia during the remainder of his life.

Moody, William Henry, American lawyer and politician: b. Newbury, Mass., 23 Dec. 1853. He was graduated from Harvard in 1876; studied law, and began the practice of his profession in Haverhill, Mass. He quickly attained success as a lawyer, was city solicitor for a time, and from 1890 to '95, district attorney for the eastern district of Massachusetts. In this position he showed himself an active, fearless prosecuting officer, notably in the case of certain aldermen of the city of Lawrence whom he convicted of receiving bribes and brought to punishment; he was also associated with the Massachusetts attorney-general as prosecuting attorney in the trial of Lizzie Borden for the murder of her parents. In 1895 he was unanimously nominated for Congress by the Republicans, to fill a vacancy; he was elected at that time, and also to the three succeeding Congresses. Through close study of the rules of the House he became distinguished as a parliamentarian, and was suggested as a possible candidate for Speaker; he was a most active and efficient member of the committee on appropriations, and regularly had charge of the Sundry Civil Appropriations Bill, which he examined in detail; he was also appointed to the committee on insular affairs, and through his work on both these committees gained special knowledge of naval matters. In 1902 he was appointed secretary of the navy to succeed John D. Long (q.v.), and on 17 Dec. 1906 became an Associate Justice of the Supreme Court of the United States.

Moody, William Vaughn, American poet: b. Spencer, Ind., 3 July 1869; d. 17 Oct. 1910. He was graduated from Harvard in 1893, where he was for a time an instructor in English, and afterwards an instructor in English literature in the University of Chicago. He published 'The Masque of Judgment,' (1900); 'Poems' (1901); and, with R. R. Lovett, a 'History of English Literature' (1902). His verse is well wrought, not infrequently rising to a sustained high level as his 'Ode in Time of Hesitation.'

Moon, William, English philanthropist: b. Horsemonden, Kent, 1818; d. England, 1894. He was educated for the Church but was compelled to abandon this career upon becoming totally blind. He devoted his life to establishing schools and educational helps for blind children and invented a new and simple system of embossed letters for the use of the blind. He established libraries of his books in Europe and United States and greatly furthered the facilities for home instruction. Consult Rutherford, 'William Moon and His Work for the Blind' (1898).

Moon, The, from the earliest times, has been the chief object in the sky to attract the attention of the human race. The continual change in its appearance from day to day, its value as a light giver at night, the apparent irregularity of its motions, the curious markings on its face, its connection with the ebb and flow of the ocean, and many a real or supposed influence in terrestrial affairs, have always caused it to be a subject of speculation and inquiry among philosophers of every age. Yet it is only within the last 300 years that the various theories and superstitions connected with it have been put to the test, and that order has been evolved from the chaos of fact and fancy. Even at the present time many a belief, tested by science and found wanting, finds support in otherwise enlightened communities.

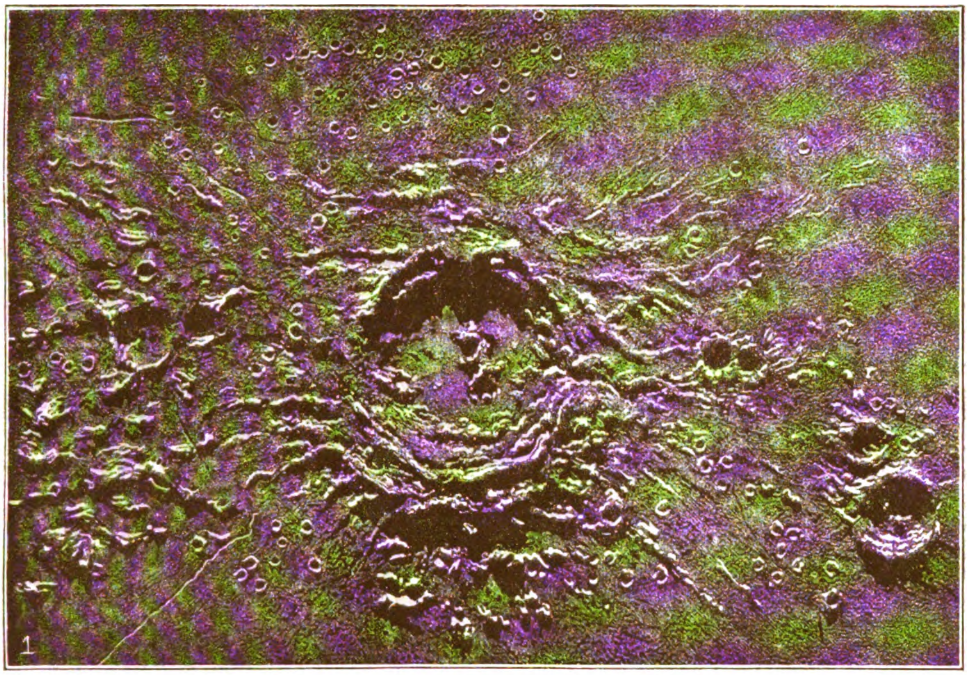
Size, Weight, etc.—The moon is a nearly spherical body with a diameter of 2,163 miles, a little more than a quarter of that of the earth, moving at an average distance from the earth of 239,000 miles. Its surface is therefore $\frac{1}{13}$ and its volume $\frac{1}{49}$ that of the earth. It is, however, less dense in the ratio of 10 to 16, or, on the average, its density is the same as that of the rocks on the earth's surface, so that it would require the materials contained in 81 moons to form our globe. Its smaller size and mass cause gravity at the surface to be only $\frac{1}{6}$ of the terrestrial attraction: the same exertion which would lift a given weight here would raise a weight six times as great there, and a body, instead of falling 16 feet in the first second, would fall only 2⅔ feet. It moves so as to always turn the same face to the earth and therefore rotates on its axis in the same time that it takes to go round the earth — about 27 days. The rotation of the moon about its axis but its motion round the earth is neither quite uniform or circular, as will be seen later; consequently extra portions of the eastern and western faces come successively into view. Further, the moon's axis is not quite perpendicular to the plane of its orbit, so that the north and south caps are in turn a little inclined toward the earth. These motions are called the librations of the moon, and they permit us to see rather more than half (about three fifths) the surface.

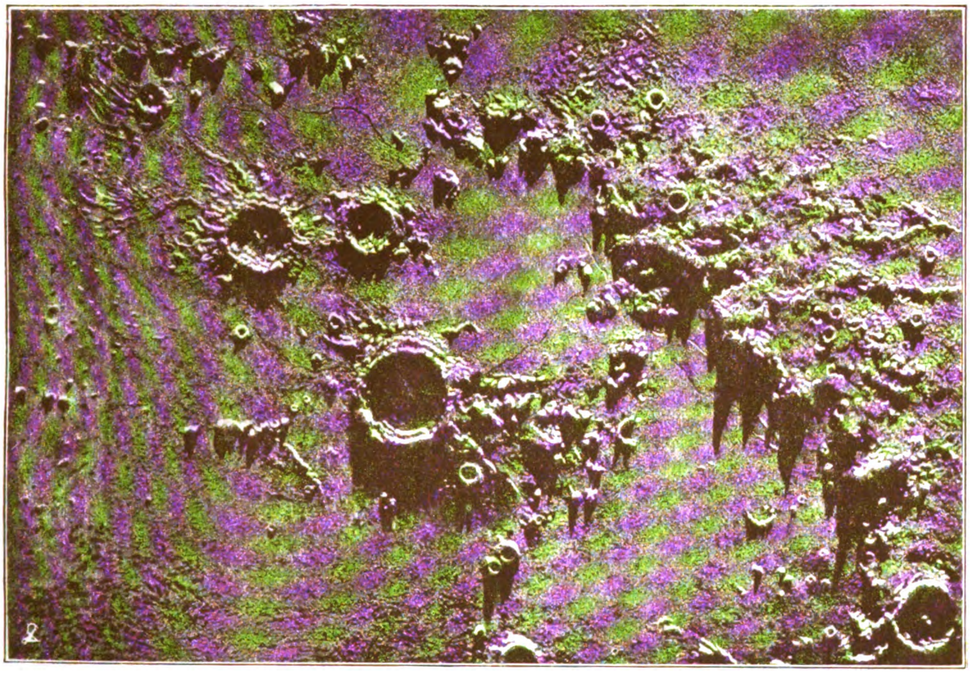
Light and Atmosphere.— Like the earth, the moon possesses no light of its own, but receives all from the sun, and its day — the interval from sunrise to sunrise — is a month. At full moon it sends to us about one 600,000th part of that given by the midday sun. The surface is not nearly so white as its concentrated light would seem to indicate; its brightest portions are nearly of the shade of salt and its darkest that of slate, the average being the color of gray weathered sandstone. The long sunshine for two weeks and the absence of sun for the following two weeks must cause immense variations of temperature. But Professor Langley of Washington estimates that the temperature of the surface, even at the hottest, probably never rises above the freezing point of water; the heat is radiated out nearly as fast as it is received. In the long night the temperature must fall to something like 200° below zero. In spite of this small amount of heat, Professor Langley, by inventing a very sensitive instrument called a bolometer which would detect the heat from a candle a mile away, succeeded in detecting heat rays coming from the moon. His results depend partly on the many fruitless attempts which have been made to find evidences of the existence of an atmosphere. If air is present its pressure cannot exceed 1-750 that at the earth's surface and it is probably much less, as no refraction has ever been observed when the moon's limb passes over a star. A similar argument applies to the existence of water in any quantity, and no clouds have been certainly seen. It is possible that water — probably in the form of ice — may exist at the bottom of some of the deeper craters, but the low temperature would scarcely permit it to be liquified even when the sun was shining full on it.

Surface Marks.— The well known resemblance of the full moon to a human face disappears almost immediately if a glass — even the smallest opera glass — is turned on to it. When it is looked at through a moderately large telescope, the surface is seen to be broken up into mountain ranges and valleys as well as darker portions, which seem to be comparatively flat. A closer inspection made at more favorable times when the moon is not full so that the shadows cast by the sun can be well seen, puts these features clearly into view. The magnificent telescope in the Lick Observatory in California brings the satellite so near that objects which might be seen with the naked eye if the moon were only 100 miles distant, can be distinguished on the surface under favorable circumstances.

Craters.— The most marked feature of the lunar surface is the number of craters which appear in almost every region. These are circular rings with diameters ranging from half a mile to 100 miles, and with exterior walls sometimes as high as 20,000 feet — formations comparatively rare on the earth's surface where they seldom exceed a diameter of a very few miles with much lower walls. In some parts they are scattered in the wildest profusion, overlapping one another, smaller ones breaking into the walls of the larger and so crowded together that it is difficult to distinguish one from another. In many cases there is a central cone or a group of peaks which often rise as high as the walls of the ring and on which small craters can sometimes be seen. There are also lofty ranges of mountains ten to fifteen thou-

SURFACE OF THE MOON.





1. The Crater of Copernicus.
2. The Appenine Mountains, and Crater of Archimedes.

Univ. Library, UC Santa Cruz 2001

sand feet high, some peaks of the Lunar Appenines rising to 20,000 feet.

Seas.— The so-called seas of the moon are simply portions of the surface darker in color than the average and very much less broken up by craters or mountain ranges. These form the main features of the face seen at full moon. They are crossed by thin lines known as rills or clefts which run in all directions, sometimes straight and unbroken for hundreds of miles, even intersecting ranges of mountains and craters and reappearing on the other side. These rills are generally 2 and rarely exceed 10 miles in width, their depth varying from 100 yards up. A curious feature of a different kind is an absolutely straight cut — the great Alpine valley — some 83 miles long, which crosses a range of mountains and under low magnification looks as if some wandering celestial body had grazed the surface.

White Rays.— The most puzzling feature of the surface consists in a series of white rays or streaks which radiate from a few of the principal craters in every direction. In their brightness they mask all other shades of tint on the surface and seem to continue their course, sometimes for hundreds of miles, quite independently of the nature of the country they cross. Prof. W. H. Pickering, however, who has studied the systems carefully, considers that their actual length has been much exaggerated and believes that the apparent length is due to lines of small craters from which they emerge. The most remarkable system is that starting from the crater Tycho, itself of a brilliant whiteness, and giving the whole region the appearance of a globe cracked by internal pressure — a suggestion made by Nasmyth who actually cracked a glass globe in this way and obtained a striking resemblance.

Origin of the Formations.— The origin of these various formations has been the object of much speculation. That the craters and mountain ranges came into existence after the cooling down of the outer crust and were produced by its contraction and by the enormous tidal disturbances caused by the earth seems a sufficiently probable hypothesis. Objection has been raised to this view on account of the fact that terrestrial volcanoes all show the presence of large quantities of water and that the earth has comparatively few of such formations. But weathering action has undoubtedly had little effect on the moon's surface, while it has been a powerful factor in eliminating such features on the earth. Another theory, that the craters are of the nature of cracked bubbles like those which appear in cooling slag which contains gases, does not require the presence of water, but it has not met with any general acceptance. The rills or clefts are unexplained; some astronomers incline to the idea that they are dried watercourses, others with greater probability that they are fissures produced in cooling. The white streaks or rays are considered by Monsieurs Loewy and Puiseux, whose work on the moon accompanies a big atlas of photographs taken lately at Paris, to be formed of volcanic dust or cinders shot out from the craters and carried for considerable distances by currents of air before being deposited on the ground. Professor W. H. Pickering inclines to the same theory. The rays were the last evidences of activity before the body of the moon became cold and absorbed the small quantities of air and water which at one time were present outside.

Surface Changes.—The evidence as to changes in the moon's surface since the first careful observations were made — about a century ago — is doubtful. One crater, Linné, observed by Beer and Mädler, is given as having a diameter of about six miles. At various times it seems to have appeared and disappeared again — possibly owing to the different circumstances under which it was seen; at present it is scarcely visible. In the absence of air and water such changes must be very rare, the weathering action which takes place on the earth having little or no effect; possibly the enormous differences of temperature every two weeks may in time cause a breaking up of the rock.

Photographs.— The photography of the moon's surface was started by Draper and Bond in America about the middle of the 19th century. The pictures of the latter were shown at the London Exhibition in 1851 and inspired De la Rue in England and others as to its possibilities for the accurate investigation of the lunar surface. The magnificent photographs of Rutherfurd made in New York and published in 1873 have only recently been surpassed by those taken at the Lick, Yerkes and Paris observatories. It is possible that photographs taken 20 or more years from now may, on comparison with these, enable astronomers to detect changes if such occur. The varying aspects of the moon will make this difficult, but the personal element, always present when drawings have to be made, will at any rate be eliminated. At the same time the eye can detect minute details which are absent from photographs.

Periods.— The average time occupied by the moon, in moving in its orbit round the earth, is 27d. 7h. 43m., its sidereal period. The synodic period is the interval between successive new moons and it is a little longer owing to the time, 365¼ days, occupied by the earth in moving round the sun. The moon performs $1/27\frac{1}{3}$ of its orbit and the earth $1/365\frac{1}{4}$ each day, and therefore the difference between these $1/27\frac{1}{3} - 1/365\frac{1}{4} = 1/29\frac{1}{2}$ is the daily fraction of its path which the moon describes with respect to the sun; that is, 29½ days (29d. 12h. 44m.) is the synodic period. If the plane of the moon's orbit coincided with that of the earth's equator, the moon would rise about 50 minutes later each day, but the inclination of these planes to one another varies between 18° and 29½°, so that this retardation is quite different at different times. When full moon occurs near the autumnal equinox, it may, in the latitude of New York, be as small as 23 minutes, while further north it may reduce to nothing, so that for several nights the full moon rises about the same time, soon after sunset. The feature is known as the harvest moon and in countries where the autumn weather is very uncertain, it is a valuable help to the farmers, furnishing them with light to get in their crops after the setting of the sun. The hunter's moon is the next full moon after the harvest moon; the same phenomenon, less marked, occurs. The anomalistic month, a little over 27½ days, is the interval between the times when the moon is in its perigee, that is, when it is nearest to the earth.

Moon's Path.— The shape of the moon's path is approximately an ellipse whose two axes are nearly of equal length, but an ellipse will only represent its orbit for a very short time. In order to give an idea of its complicated motions, a model, on a scale of 1:125,000,000, can be constructed as follows: The first part, to represent the motion of the earth, consists of a rail on raised supports (which are movable) in the shape of an ellipse whose semi-axes are respectively 390 feet 10 inches and 390 feet 3 inches long and whose plane we shall for convenience take to be horizontal. The earth is represented by a carriage moving on this rail and the sun by a ball placed on the longest diameter, distance 6 feet, 7 inches from the centre of the ellipse. A straight bar two feet long is attached to the carriage by a ball and socket joint at a point ⅔ inch from the centre of the bar. The bar forms the longest diameter of an elastic tube in the shape of an ellipse and the tube is so attached to the bar that it may change its size and shape slightly. The plane of the tube is to be inclined about 5° to the horizontal. A bead sliding freely within the tube represents the moon.

Motion.— Now let the carriage run along the rail not quite uniformly but so that its angular velocity about the ball representing the sun varies inversely as the square of its distance from the ball, and it makes it a complete circuit once in 365¼ days. At the same time the plane of the tube attached to the carriage is to turn round slowly in the opposite direction, so that the horizontal line in it (that formed by the intersection of the plane of the tube with the horizontal plane and called the line of nodes) will describe a circuit once in 18⅔ years; the inclination of the tube is to oscillate not more than 5′ on either side of the mean inclination of 5° 8′ to the horizontal. With these motions, the bar carrying the tube is to slowly turn round in its own plane in a forward direction so as to complete a circuit once in about 9 years, and the tube is to slightly change its shape and size to and fro as it moves. Finally, the bead representing the moon moves according to the same law and in the same direction as the carriage, that is, not quite uniformly, but so that its angular velocity about the joint varies inversely as the square of its distance from the joint; its circuit in the tube is completed once in 27.5546 days — the anomalistic period. These various motions, complicated as they are, only give a general idea of the way in which the moon moves, but the model is sufficient to explain most of the phenomena connected with the moon's motion. All the parts are in a state of oscillation about their average positions, the periods varying from a few days to many thousand years. Even the plane, size, shape, and position of the rail are not quite constant but vary slowly from year to year. The attempt to disentangle even the principal oscillations had become an almost hopeless task until Isaac Newton in the 17th century was able to reduce them all to manifestations of a single law known as the law of gravitation. This law states that every two particles of matter in the solar system attract one another with a force which is proportional directly to the product of the masses and inversely to the square of the distance between them, that is, if either of the masses be doubled. the force is doubled, but if the distance be halved, the force is increased four-fold. From his time mathematicians have been engaged in working out the consequences of this law. If there are only two particles acting, they describe ellipses about one another, but if more than two act, the motion is so complicated that it taxes the mathematician to the utmost to determine it completely. The moon is attracted mainly by the earth, but it is much disturbed from its elliptic motion round the earth (that in the tube) by the pull of the sun (which mainly causes the motions of the tube), and to a small extent by that of the planets. Up to the last quarter of the 19th century this work was undertaken by European mathematicians, among whom may be mentioned Euler, Laplace, de Pontecoulant, Hansen, Delaunay and Adams: the tables of Hansen, published in London in 1857, are still used, with a few corrections, for the places of the moon in the nautical almanacs of the present day. The greatest advance made during the last 30 years was started by Dr. George William Hill, who was for many years on the staff of the 'American Nautical Almanac' at Washington. His two papers published in 1877 opened a new era in the mathematics of astronomy and especially in that of the moon, and they have formed the basis of nearly all the progress which has since been made in all departments of celestial mechanics. His name, though fully known to astronomers all over the world, is less familiar to the public, on account of the highly mathematical nature of his work. In a different part of the subject, the work of Professor Newcomb is not less valuable, comprising, as it does, difficult and laborious investigations into the sufficiency of Newton's law for the explanation of every detail of the moon's motion, and involving researches into ancient records of eclipses of the sun. A new theory of the moon's motion, leading to the formation of new tables, has now been nearly completed by E. W. Brown on the basis of Dr. Hill's work. Brown has shown that Newton's law of gravitation will account for the motion of the perigee of the moon within $\frac{1}{1000000}$ of one per cent.

Secular Acceleration.— In illustration of the great accuracy with which calculations and observations may be compared at the present time may be mentioned what is known as the secular acceleration. Observation shows that at the end of each century the average time of revolution of the moon round the earth is 2 seconds less than it was at the beginning. Newton's law shows that a slight change in the shape of the earth's orbit (that is in the shape of the rail above) due to the attractions of the planets will account for ⅗ of this amount; the other ⅖ are still unexplained. This means that astronomers are searching for the cause of a monthly change of less than 1/1000 of a second in the length of the month.

Phases.— The phases of the moon arise from the combined motion of the earth and moon. To resume our mechanical model, imagine the tube to be transparent and the ball an electric light. When the bead is furthest from the ball, the side of the bead facing the carriage is illuminated and this corresponds to full moon. As the bead moves round the tube a spectator on the carriage sees less and less of the illuminated half; the bead then passes through its third and last quarters until it is at its nearest to the ball and almost invisible. Still progressing, its illuminated half begins to be visible from the other side (new moon) and passing on to its first

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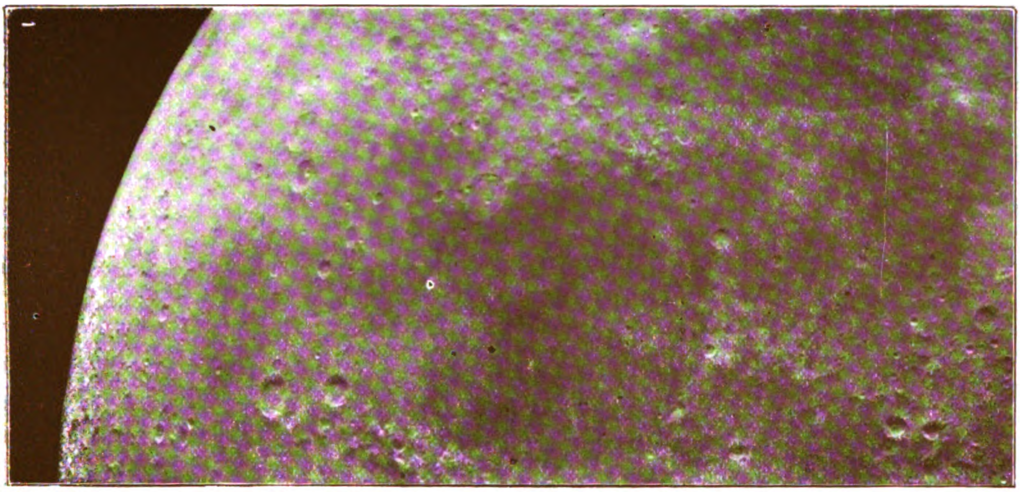
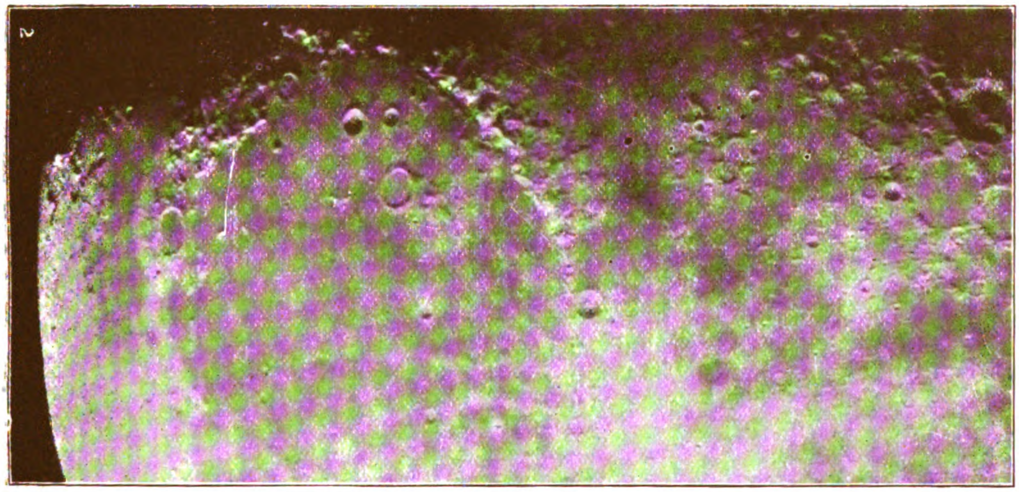
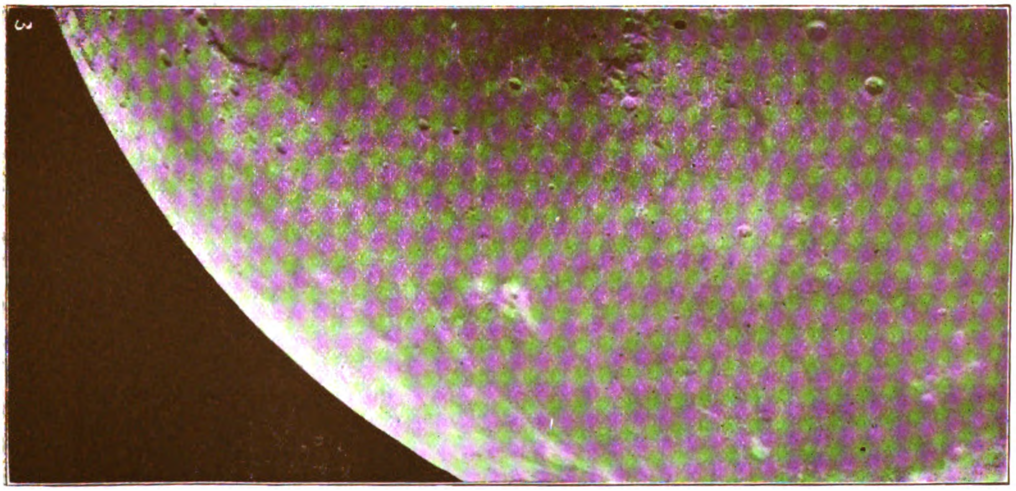
SHOWING SOME OF THE MORE PROMINENT CRATERS.







1. Mare Tranquillitatis. Mare Serenitatis. 2. Mare Imbrium. Plato.
3. Kepler. Aristarchus.

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and second quarters its illuminated half is again fully seen.

Eclipses.— An eclipse of the moon takes place whenever the earth gets between the moon and the sun, cutting off the light of the latter from the moon, an eclipse of the sun when the moon gets between the earth and the sun. (See ECLIPSE.). It so happens that the apparent size of the moon as seen from the earth is very nearly equal to that of the sun. Owing to the varying distance of the moon and sun from the earth, sometimes the moon, as seen from a place on the earth, will completely cover the sun for a time which may be as long as 8 minutes, and we have a total eclipse; at other times it fails to cover it and we get a partial eclipse or, if its centre passes across the sun's centre, an annular eclipse. A total or annular eclipse is seen over only a narrow band of the earth's surface. From our mechanical illustration it is evident that an eclipse of the moon can occur only at full moon, and one of the sun just before new moon. If the plane of the tube were horizontal, there would be eclipses of both moon and sun every revolution of the bead, that is, once a month; actually, it is only when the bead is very near the horizontal plane (or near the line of nodes) at the time when it is nearest or furthest from the ball, that the event can take place. A complete cycle of eclipses will evidently occur each time the line of nodes completes a circuit — once in about 18 years. This is known as a lunar cycle and during that period there will be on the average 41 eclipses of the sun and 29 of the moon.

Tides.— Besides the indirect effect of the moon as a light-giver on the earth the most important influence it exerts is that which causes the tides. (See TIDES.) These have in their turn a slight reactionary effect on the motion of the moon as we shall see presently. Some slight traces of lunar effect are also observable in the variations of the earth's magnetism. But the most widespread idea with regard to lunar influence is its supposed connection with the changes in the weather. Many an old saying exists, handed down the ages, giving a rule for prophesying the weather by its condition at certain phases of the moon. Since the time when careful daily records have been kept of the temperature, height of the barometer, rainfall, etc., science has been employed in examining whether any kind of period can be traced in them and especially periods connected with the moon's changes. Little positive success has attended these efforts, but there is plenty of negative evidence. Every attempt to connect a periodical change in the weather with one in the moon's motion has resulted in failure. Undoubtedly some slight connection of a tidal nature must exist, but it is very small and is entirely masked by variations of the weather due to unknown causes. A reason for the popular error is not far to seek. The weather changes, especially in countries lying within the temperate zone, follow one another at short and seemingly irregular intervals; the changes of the moon's phases occur also at short but regular intervals. Coincidences between the two must frequently occur, but humanity is apt to notice these and to forget the failures of coincidence which are just as numerous if not more so.

Origin.— The past and future history of our satellite has been the subject of interesting researches during the last 30 years, principally undertaken by Professor George Howard Darwin. The chief influence in its life history is assigned by him to tidal action, an idea first broached in 1754 by the philosopher Emmanuel Kant. Imagining that the earth, unattended by any satellite, was in a molten condition — the most probable supposition in view of its nearly spherical form and the nature of its surface — Professor Darwin inquires under what conditions its rotation should be so rapid that, like a bursting fly-wheel, portions of matter should be thrown off. He finds that this would happen if the earth were rotating about its axis in something like two hours. He has also shown that pear-shaped and dumb-bell shaped forms will result from a rapid rotation and from the action of the sun in producing tides; the moon might have been evolved from such a figure by the thinning and breaking of the handle. The earth would then have a satellite revolving very close to its surface in the same time that the earth took to turn on its axis. Either of these hypotheses seems to be allowable.

Past History.— From this point, rigorous argument takes the place of speculation. The period of the satellite's revolution (a «month») begins to be slightly longer than that of the earth's rotation on its axis (a «day»). The moon raises tides on the earth and the friction of these, like a break on a fly-wheel, gradually lengthens the day; the reactionary effect on the moon is to increase the length of the «month» also, but more rapidly than the «day.» This goes on until the number of «days» in a «month» is 29. After this date, the month and day still go on getting longer but at different comparative rates, so that the number of days in a month diminishes until it is 27⅓ — the present condition. The time in which all these changes have taken place must be reckoned in millions or tens of millions of years and though both bodies have grown cool and solid, the water on the earth's surface has in the later portion maintained the process at a slower rate. All this time the tidal friction has also had the effect of sending the moon further and further away from the earth.

Future.— In the future, the same processes will continue. The lengths of the month and that of the day will continue to increase, the latter overtaking the former until they are both over 1,300 hours or about 55 of our present days. Then, not only will the moon turn always the same face to the earth, but the earth will turn the same face to the moon and they will move together as if strung on a rigid bar. The same causes have operated to cause the moon always to present the same face to the earth. When the satellite was in a molten condition and not far from the earth, the tides raised on it by the attraction of the earth must have been enormous. The friction of these tides passing over the surface of the moon then slowed down the rotation of the moon on its axis until it was in a position where no more friction could act; that is, high tide on the moon was always at the same place on the moon and just under the earth. The axis of the moon in the direction of the earth must from this cause be a little longer than the other axes, though the difference has not been certainly observed.

Bibliography.— Besides the numerous textbooks on general astronomy, all of which contain information, readers may consult Nasmyth, ‘The Moon’ (2d ed. 1903); Neison, ‘The Moon’ (1873); Proctor, ‘The Moon’ (1876); the ‘Lunar Theory’ (1896) by the writer is a mathematical treatise on its motions. ‘The Tides,’ by Darwin, contains the latest theories concerning its past and future history. A new photographic atlas and description by Pickering has just appeared. The Lick and Paris observatories are also gathering materials for a complete description and charts of the surface.

Ernest W. Brown,
Haverford College, Haverford, Pa.

Moon Hoax, The, an ingenious work by Richard Adams Locke, published in 1859. It pretends to announce the discovery of a vast human population in the moon. Its contents first appeared in 1835, in the New York *Sun,* under the title, ‘Great Astronomical Discoveries Lately Made by Sir John Herschel’; increasing the circulation of that paper, it was said, fivefold. The skit was soon afterward published in pamphlet form, the edition of 60,000 being sold in less than a month. This account purported to be taken from the Supplement to the Edinburgh ‘Journal of Science,’ and was most circumstantial. The discovery was asserted to have been made at the Cape of Good Hope, by means of a new and vastly improved telescope invented by Herschel, but unfortunately destroyed by fire. The sensation produced by this nonsense was widespread and profound. The press took sides for and against its authenticity, and for some time a large public credited the statements made.

Moon, Mountains of the, Africa, a mythical chain of mountains designated by Ptolemy as containing the sources of the Nile, and extending across the broadest part of Africa, from Cape Guardafui on the Indian Ocean, to the Bight of Benin, on the Atlantic. Modern exploration has proved that no such range exists, though there are numerous different mountain systems in that extensive region. The only mountains that can be looked upon as representing the ancient Mountains of the Moon lie in eastern Equatorial Africa. The loftiest of these are Mount Kilimanjaro, which is estimated to be 18,800 feet high, Mount Kenia, which has an estimated elevation of 18,000 feet, and Ruwenzori, which is also 18,000 feet in height.

Mooney, moo'nĭ, **James,** American ethnologist: b. Richmond, Ind., 10 Feb. 1861. He was educated in the public schools, engaged for a time in teaching and in 1879 entered a newspaper office. He continued the study of Indian ethnology which had fascinated him from boyhood and in 1885 became a member of the Bureau of American Ethnology at Washington. He has made a series of investigations covering the Southern and Western Indian tribes and prepared the government Indian exhibits for the Chicago, Nashville, Omaha, and St. Louis expositions. He has published: ‘Medical Mythology of Ireland’ (1887); ‘Holiday Customs of Ireland’ (1890); ‘The Ghost-Dance Religion and the Sioux Outbreak of 1890’ (1892–3); ‘Calendar History of the Kiowa Indians’ (1898); etc.

Mooney, John Aloysius, American author: b. New York 20 May 1843; d. Hurricane Mountain, Adirondack Mountains, 26 July 1903. He was graduated from Saint Francis Xavier's College in 1850, and in 1889 received from his alma mater the degree of LL.D. His works were chiefly philosophical, historical, and theological, and appeared first in monthly and quarterly periodicals in America and Europe. Among them are: ‘Giordano Bruno’; ‘Art and Artists’ (1886); ‘Professor Janssen and Other Modern German Historians’ (1887); ‘Antonio Franchi’ (1890); ‘Rosmini and Gioberti’ (1892); ‘Joan of Arc’; ‘Law and Liberty in Mediæval Spain’; ‘Biography of Archbishop Corrigan’ (1903); and many others.

Moon'eye, a fish of the small family *Hyodontidæ,* related to the herrings, and sometimes called toothed herrings. They inhabit the rivers and lakes of the interior of North America, and are elegant, silvery, large-eyed fish, 8 to 12 inches long, extraordinarily well supplied with teeth, and voracious. "They are eager biters, and take indiscriminately the feathered lures, small spoons, grasshoppers, grubs and other natural baits." In Canada they afford much sport in fly-casting, and repeatedly leap into the air when hooked, like trout. The principal species called mooneye is *Hyodon tergisus;* the more northerly one, called toothed herring and la quèche (Canada), is *H. alosoides.* Neither is good for food.

The "Mooneye cisco" is a small whitefish (*Argyrosomus hoyi*), related to the lake herring (see WHITEFISH).

Moon'fish, any of the compressed ovate highly silvery fishes of the genera *Selene* and *Vomer,* including small tropical forms allied to the pompanos. One greenish species (*Vomer setipinnis*) is well known in New York Bay and markets as a pan-fish, sometimes called blunt-nosed shiner. More widely recognized is the look-down or horse-head (*Selene vomer*), which reaches a length of two feet, and is regarded along the South Atlantic coast as one of the best of food-fishes; it also occurs along the western coast of Mexico and Central America, as do certain other species. It has a rhomboidal outline, with the hind-head greatly elevated, the line of the profile almost equal to the length of the body; and the dorsal and ventral fins prolonged into streamers. Consult Jordan and Evermann, ‘Food and Game Fishes’ (1902).

Moonga, or **Moogha.** See SILKWORM.

Moon'seed. See SARSAPARILLA.

Moon'shiner, a term applied in the United States, and especially in the Southern and Western States, to makers of illicit whiskey, and other spirituous liquors. Moonshine stills are frequently raided by the secret service officers. Of late years the business has been largely confined to the Tennessee and Kentucky mountain regions.

Moon'wort, a popular name for a fern (*Botrychium virginianum*) of the natural order *Ophioglossaceæ,* and also for various species of *Lunaria* of the natural order *Cruciferæ.* The former is the most popular of its genus, being readily grown in partial shade and with no special treatment; the latter are also readily cultivated under ordinary garden conditions and are popular because of their showy flowers but more especially because of their large, flat pods which are used in winter decorations. One of their popular names, honesty, is suggested by

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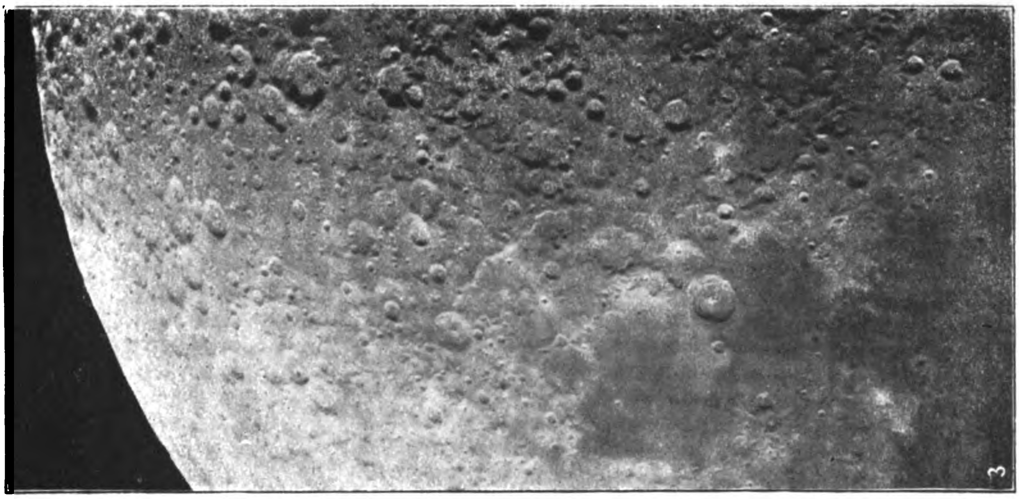

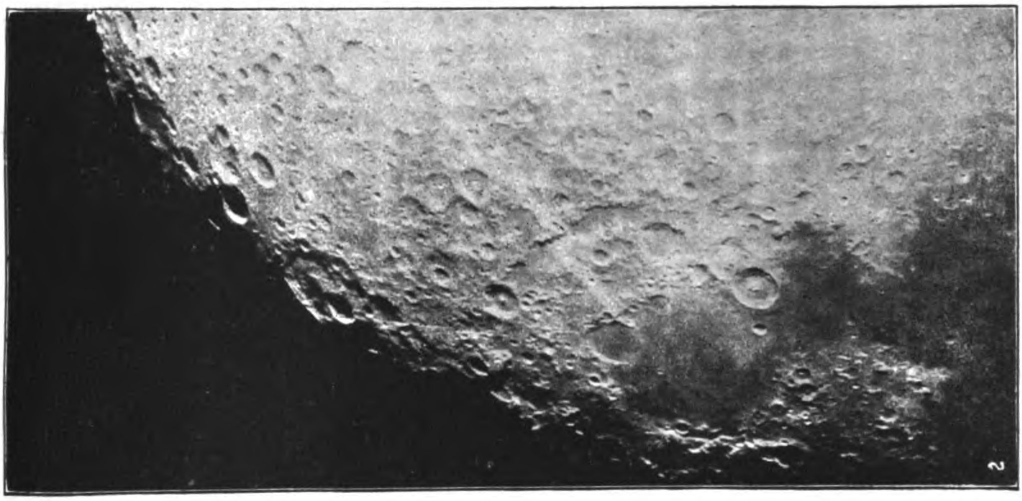

1. The Full Moon. 2. Piccolomini. Theophilus. 3. Piccolomini. Theophilus.

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visibleness of the seeds through the pods. *Lunaria annua*, especially its variegated variety, is the most valuable species.

Moore, moor or mōr, **Alfred,** American jurist, son of Maurice Moore (q.v.): b. Brunswick County, N. C., 21 May 1755; d. 15 Oct. 1810. At 20 he became captain in a regiment of North Carolina troops, but was soon afterward obliged to resign in order to provide for his destitute relatives. When the British seized Wilmington, however, he raised a troop of volunteers, with whom he rendered great service to the American cause. In order to alleviate the distress to which his patriotism had reduced him, the general assembly in 1790 made him attorney-general; and though he had not yet mastered the first rudiments of law, he soon attained, by hard study, a foremost rank in his profession, was raised to the bench in 1798, and became associate justice of the Supreme Court of the United States in 1799. He resigned in 1805.

Moore, Benjamin, American Protestant Episcopal bishop: b. Newtown, L. I., 5 Oct. 1748; d. New York 27 Feb. 1816. He was graduated at King's (now Columbia) College in 1768, studied theology, and in May 1774 went to England to obtain orders, and in June of the same year was ordained deacon and priest. On his return to New York he became an assistant minister of Trinity Church, and succeeded to the rectorship in December 1800. In 1801 he was consecrated bishop of New York. He was also rector of Trinity Church and president of Columbia College. In 1811 he was attacked by paralysis, which rendered him incapable of further active duty, and an assistant bishop was consecrated in May of the same year.

Moore, Charles Herbert, American professor of art: b. New York 10 April 1840. He was educated at Harvard and has been art professor there for many years. He has published ‘Examples for Elementary Practice in Delineation’; and ‘The Development and Character of Gothic Architecture’ (1889, enlarged ed. 1899). In the latter work, which has been widely circulated among students of architecture, he takes the position, earlier adopted by Viollet le Duc, that English Gothic is wholly a development from a French source, and that the progress of the art in England was always some years behind its French original. His warm advocacy of this view has excited some opposition among English critics.

Moore, Charles Leonard, American poet: b. Philadelphia, Pa., 16 March 1854. He was educated in the public schools of Philadelphia, and in 1878–9 was United States consular agent at San Antonio, Brazil. He has published: ‘Atlas’ (1881); ‘Poems Antique and Modern’ (1883); ‘Book of Day Dreams’ (1883); ‘Banquet of Palacios’ (1889); ‘Odes’ (1896); ‘Ghost of Rosalys’ (1900); etc.

Moore, Clement Clarke, American educator and poet: b. New York 15 July 1779; d. Newport, R. I., 10 July 1863. He was a son of Benjamin Moore (q.v.); was graduated at Columbia College in 1798; in 1821 became professor of biblical learning at the General Theological Seminary, New York, and retired from that position in 1850. He gave to the seminary the ground on which it stands. A collection of ‘Poems’ which he published in 1844 included ‘A Visit from Saint Nicholas,’ better known under another title — ‘'Twas the Night Before Christmas’ — which has long had great popularity with grown people as well as with children. Written in 1822 for his own children, these verses were printed anonymously, and without Moore's knowledge, in the Troy ‘Sentinel’ 23 Dec. 1823. He also compiled a ‘Hebrew and English Lexicon’ (1809), and wrote ‘George Castriot, Surnamed Scanderbeg, King of Albania’ (1850). Consult Stedman, ‘An American Anthology’ (1900).

Moore, David Hastings, American Methodist bishop: b. Athens, Ohio, 4 Sept. 1838. He was graduated from the Ohio University in 1860 and ordained to the ministry in that year, but entered the Federal army at the outbreak of the Civil War and remaining in it till the close of the War and attaining the rank of lieutenant-colonel. He has been president of the Cincinnati Wesleyan College and of the Colorado Seminary, and chancellor of the University of Denver. He was elected bishop in 1900, and is stationed in Shanghai, China, in charge of the missions of China, Japan, and Korea.

Moore, Edward, English Dante scholar: b. Cardiff. He was educated at Pembroke College, Oxford, where he received high honors and became honorary fellow, and in 1864 became principal of Saint Edmund Hall. His early research was on Aristotle, and his editions of the ‘Ethics’ and of the ‘Poetics’ are excellent. But he is much more favorably known for his studies of Dante, and has published: ‘Time References in the Divina Commedia’ 1887; revised, in Italian, 1900); ‘Textual Criticism of the Divina Commedia’ (1889); ‘Dante and His Early Biographers’ (1890); the ‘Oxford Dante’ (complete in one volume 1894); and ‘Studies in Dante’ (2 series 1896, 1899).

Moore, Frank Frankfort, British novelist and dramatist: b. Limerick, Ireland, 15 May 1855. He was educated at the Royal Academical Institution, Belfast, and has traveled extensively in Africa, India, and South America. From 1876 to 1892 he was art editor of the Belfast ‘News Letter.’ He has since lived in London. Among his novels are: ‘Sojourners Together’ (1875); ‘Told by the Sea’ (1877); ‘Tre, Pol, and Pen’ (1887); ‘A Grey Eye or So’ (1894); ‘They Call It Love’ (1895); ‘The Jessamy Bride’ (1897); ‘Nell Gwynne’ (1900); ‘The Capture of Coralie’ (1900). Popular plays by him include ‘Moth and Flame’ (1878); ‘Broken Fetters’ (1881); ‘Oliver Goldsmith’ (1892); ‘The Discoverer’; ‘Kitty Clive’ (1895); etc.

Moore, George, English author: b. Ireland 1853. He studied art in London under Luyten, but completed his education in France, and was thoroughly imbued with a Gallic spirit. Apart from a few contributions to periodicals, his first literary work was contained in two volumes of quasi-French verse, ‘Flowers of Parnassus’ (1877) and ‘Pagan Poems.’ With his entry into fiction he allied himself immediately with the French realistic or naturalistic school, as may be seen in ‘A Mummer's Wife’ (1884), a story of the degeneration of a farmer's wife, her elopement with a strolling player, and the sufficiently squalid sequel; in 'Mike Fletcher' (1891), in which a gay young Irishman wins a fortune by his wits and his social success, and then swings from his riotous living to remorse and back again, only to commit suicide at the end; or in 'Esther Waters' (1894), a detailed sketch of life among the servant class and in a country inn, the theme being the allurements of gambling. 'Evelyn Inness' (1898) and its sequel, 'Sister Teresa' (1901), are a keen analysis of a musical and sensuous temperament under the successive influence of social temptation and of convent life. What he exemplified in these novels he stated abstractly but over-eagerly and passionately in 'Confessions of a Young Man' (1888) and 'Impressions and Opinions' (1890), both urging the dead level of mediocrity or worse in English literature of the day as contrasted with French. His desire to found an English «Theatre Libre» and his growing conviction that the English stage and English novel were far gone led him to form the Irish Literary Theatre in Dublin and to take a prominent part in the movement styled The Irish Renaissance, a movement of which his 'Bending of the Bough' (1900) is one of the most promising dramatic productions.

Moore, George Foot, American Orientalist: b. West Chester, Pa., 15 Oct. 1851. He was graduated at Yale in 1872, and at Union Theological Seminary in 1877. Entering the Presbyterian ministry, he was pastor of the Putnam Presbyterian Church, Zanesville, Ohio, 1878-83, and in the latter year became Hitchcock professor of Hebrew and the history of religions at Andover Theological Seminary, and from 1899 to 1901 was president of the faculty there. Since 1892 he has been professor of biblical literature and the history of religions at Harvard. For some years he edited the 'Journal of the American Oriental Society.' He has written: 'A Commentary on Judges' (1895); 'The Book of Judges,' a translation with notes for the Polychrome Bible (1898); and 'The Book of Judges in Hebrew' (1900).

Moore, George Henry, American historical writer: b. Concord, N. H., 20 April 1823; d. New York 5 May 1892. In 1839 he removed to New York, and was graduated at the University of the City of New York (now New York University) in 1843. As assistant to his father, Jacob Bailey Moore (q.v.), librarian of the New York Historical Society, he had been long connected with that institution when, in 1849, he succeeded to his father's position, which he held until 1872, and then became first superintendent of the Lenox Library. This office he retained until his death. His contributions to the proceedings of historical societies and to historical magazines were numerous. He also published: 'The Treason of Charles Lee' (1858); 'The Employment of Negroes in the Revolutionary Army' (1862); 'Notes on the History of Slavery in Massachusetts' (1866); and 'A History of the Jurisprudence of New York' (1872).

Moore, Harry Humphrey, American artist: b. New York 1844. He studied under Gérôme at Paris and Fortuny in Madrid, and subsequently made painting tours through Germany, Italy, and as far east as Japan. He has devoted himself to such genre pictures as his two masters excelled in, and his best known works are: 'Gypsy Encampment, Granada'; 'Moorish Water-Carrier'; 'Almeh'; 'The Blind Guitar-Player'; and 'A Moorish Beggar.'

Moore, Sir Henry, English colonial governor: b. Vere, Jamaica, 1713; d. 1769. In 1756 he became lieutenant-governor of the island, and until 1762 was practically in control of its affairs. He suppressed the slave insurrection of 1760, and for that service was rewarded with a baronetcy. Appointed governor of New York in July 1765, he reached there at the outbreak of the Stamp-Act excitement. Public opinion was strongly pronounced against the act, and Moore, yielding to the demands of the colonists, suspended its enforcement. He remained governor until his death.

Moore, Henry, Irish Wesleyan clergyman: b. near Dublin 1751; d. 1844. He joined a Methodist class in 1777, began to preach, gave up his trade of wood-carver, opened a school, and in 1779 was appointed by Wesley to the Londonderry circuit. Called later to London, he assisted Wesley (1784-6) as traveling companion and amanuensis, serving again in the same capacities 1788-90. Wesley appointed him one of his three literary executors, and also selected him to become (after Wesley's death) one of 12 ministers in charge of services at the City Road Chapel, London. In 1804, and again in 1823, Moore was president of the Wesleyan Conference. Refusing ordination in the Church of England, he was ordained by Wesley, with two Episcopal clergymen assisting. The proposal of a hierarchy for the Methodist Church was opposed by Moore, who also objected to the scheme for establishing a Methodist theological school, likewise to the proposed acquisition of land by the Methodist body in 1839, when the centenary fund was created. In 1792, with Thomas Coke, he published a 'Life of the Rev. John Wesley.' Although the work was authorized by the Conference, the third literary executor prevented them from using Wesley's papers in its preparation. With the aid of these a new 'Life' was published in 1824-5. Moore also wrote: 'A Reply to Considerations on the Separation of the Methodists from the Established Church' (1794); 'Thoughts on the Eternal Sonship' (1816); 'The Life of Mrs. Mary Fletcher of Madeley' (1817); 'A Short Account of Miss Mary Titherington of Liverpool' (1819); 'Sermons,' with an autobiography (1830). Consult his life (with the autobiography) by Mrs. Richard Smith (1844).

Moore, James, American colonial leader: b. probably in Ireland about 1640; d. 1706. He is supposed to have been a son of the Irish rebel Roger Moore, and to have come to this country about 1665. Settling in South Carolina, he became a leader among those who openly resisted the lords proprietors in their oppressive demands. In 1682 he was made a member of the governor's council, and in 1692 was sent to the Assembly. In the latter year the proprietors named him for exclusion from their pardon. Two years later he was again one of the governor's council; that body in 1700 elected him governor; and he filled the executive office until 1793, when Sir Nathaniel Johnson arrived. Appointed by the Assembly to lead an expedition for the capture of Saint Augustine, Moore took the town without difficulty, but failed to reduce the fort. Under Governor Johnson he served as attorney-general, and was successful in an expedition against the Apalachee (q.v.). Consult McCrady, 'History of South Carolina Under the Proprietary Government' (1897).

Moore, James, American colonial officer: b. Charleston, S. C., 1667; d. 1723. He was a son of the James Moore preceding, in whose expeditions against the Indians he participated. In 1713 Gov. Craven appointed him commander of the forces sent to aid the North Carolina colony against the Tuscarora Indians, and two years later served as lieutenant-general of an expedition sent to subdue the Yamasi. In 1719, when Gov. Robert Johnston was deposed, the Convention having made an end of the proprietory government, Moore became governor. He was succeeded in 1721 by Francis Nicholson, who was commissioned by the English crown.

Moore, John, Scottish physician and author: b. Stirling, December 1729; d. Richmond, Surrey, 21 Jan. 1802. Having obtained a knowledge of medicine and surgery he went to the Netherlands in 1747, and served as a mate in the military hospitals. Returning to Scotland he practised till 1772. In that year he became medical attendant to the 9th Duke of Hamilton, whom he accompanied on a five-year tour on the Continent. In 1779 he published 'A View of Society and Manners in France, Switzerland, and Germany' which passed through numerous editions, and has been translated into several foreign languages. In 1781 appeared his 'View of Society and Manners in Italy'; and in 1785 'Medical Sketches,' followed by 'Zeluco,' a novel (1786); 'A View of the Causes and Progress of the French Revolution' (1795); and two other novels, which were not so successful as his first.

Moore, Sir John, British soldier, son of the preceding: b. Glasgow, Scotland, 13 Nov. 1761; d. Spain 16 Jan. 1809. He served as brigadier-general in the West Indies (1795), in Ireland during the rebellion of 1798, in Holland in 1799, and in Egypt in 1801. Moore was by this time one of the most distinguished of British generals and in 1805 was knighted. Appointed commander-in-chief of the British army in Portugal to operate against Napoleon in 1808, he advanced to Salamanca in spite of the gravest difficulties, but was finally compelled to retreat to Coruña, in face of a superior force. The absence of the fleet to receive his army forced him to a battle against Marshal Soult, in which Moore fell, mortally wounded, in the hour of victory. At the present time he is chiefly remembered through Wolfe's celebrated poem, 'The Burial of Sir John Moore.' Consult Carrick Moore, 'Life of Sir John Moore' (1835).

Moore, John Bassett, American lawyer, politician, and educator: b. Smyrna, Del., 3 Dec. 1860. He was graduated from the University of Virginia in 1880; was admitted to the bar in 1883; in 1886–91 was 3d, in 1898 1st, assistant secretary of state; in 1887 was United States secretary in the Samoan conference, in 1887–8 at the fisheries conference; and in 1898 was council and secretary to the United States peace commission at Paris. In 1891 he became professor of international law and diplomacy at Columbia University, and in July 1903 was chosen president of the University of Virginia. He is a recognized authority on international law, has written 'A Treatise on Extradition and Interstate Rendition' (1891); 'Kossuth' (1895); 'History and Digest of International Arbitrations' (1898); and other works.

Moore, Maurice, American patriot and jurist: b. Brunswick County, N. C.; d. 1777. Having studied for the bar, he acquired a high reputation as a lawyer, was one of the three colonial judges of North Carolina at the time of the Revolution, was a member of the provincial congresses at Hillsborough in 1775 and Halifax in 1776, and had a prominent part in framing the constitution of North Carolina. He was one of a committee appointed at the commencement of the Revolution to draw up an address to the people of Great Britain on the wrongs of the North American colonies.

Moore, Thomas, Irish poet: b. Dublin 28 May 1779; d. Bromham, near Devizes, 25 Feb. 1852. He was educated at Trinity College, Dublin, with a view of becoming a lawyer, and in 1800 entered as a student at the Middle Temple. The office of collector at Bermuda was bestowed on him in 1803. He found the post a sinecure, and quitted it after appointing a deputy to perform his duties. In November 1804 after a tour through the United States and British America, he was back again in England. In 1806 he published 'Odes and Epistles,' which contained some attacks on America, and, castigated by Jeffrey in the 'Edinburgh Review,' occasioned the memorable duel between him and the distinguished critic. Moore entered in 1807 into an engagement with Power, the music publisher, to produce a series of adaptations to the national Irish airs, he furnishing the words and Sir John Stevenson the music. This great undertaking, which extended over a number of years, only completed in 1834, is the work on which his reputation will mainly rest. Many of the numbers, such as 'The Last Rose of Summer,' and 'Those Evening Bells,' are generally familiar. His 'National Airs' (1875) included 'Oft in the Stilly Night,' and the 'Sacred Songs' (1816); 'Sound the Loud Timbrel.' Moore was himself an excellent vocalist. 'The Twopenny Post Boy, by Thomas Brown the Younger,' a series of satires on the proceedings of the prince-regent and his ministers, appeared in 1812, and by their genuine wit attracted much attention. The same year he removed to Mayfield Cottage, near Ashbourne, Derbyshire, and here his 'Lalla Rookh' was elaborated. Its production was the result of an agreement with Messrs. Longman, by which he was to receive 3,000 guineas for a poem to form a quarto volume. It appeared in 1817, and its success fully justified the liberality of Moore's publishers. It was translated into numerous languages, and attained a European fame. Later criticism has deemed it rather a work, as Garnett says, «of prodigious talent,» than of the genius ascribed to it in Moore's own day. The same year appeared a satirico-burlesque poem, 'The Fudge Family in Paris,' in the form of a series of amusing letters supposed to be written by the different members of an excursion party to the Continent. 'Rhymes on the Road' and 'Fables of the Holy Alliance' followed in 1819. About this time he became involved in serious embarrassments by the defalcations of his deputy in Bermuda, and found himself suddenly called upon to make up a deficiency of £6,000, ultimately reduced to about £1,000. This vast sum he contrived to clear off by his literary earnings. In 1822 appeared his 'Loves of the Angels.' The 'Life of Sheridan' was produced in 1825, and the 'Epicurean,' a prose romance of small value, in 1827. Next came the justly praised 'Life of Lord Byron' (1830). (See BYRON.) His remaining works include the 'History of Ireland' (1846), written for Lardner's 'Cyclopedia' and a task which he found very severe. For nearly the last 30 years of his life he resided at the cottage of Sloperton, near Devizes. A biography in eight volumes, edited from his journal and correspondence, was published after his death by his friend Lord John Russell (1853-6). Consult also: Vallat, 'Thomas Moore sa Vie et ses Œuvres' (1887); Gunning, 'Thomas Moore, Poet and Patriot' (1900).

Moore, William Thomas, American clergyman: b. Henry County, Ky., 27 Aug. 1832. He was graduated from Bethany College, W. Va. in 1858 and entered the ministry of Disciples of Christ the same year. He held several pastorates in that denomination in Frankfort, Ky., and Cincinnati, was for ten years pastor of West London tabernacle, England, and since 1896 has been dean of the Missouri Bible College at Columbia, Mo. He has published 'Living Pulpit of Christian Church' (1868); 'The Fundamental Error of Christendom' (1902); etc.

Moore, Willis Luther, American meteorologist: b. Scranton, Pa., 18 Jan. 1856. At eight years he joined his father who was with Grant's army at City Point, and sold papers to the troops in the field. He was educated in Binghamton (N. Y.) public schools, became compositor and reporter on the Binghamton 'Republican'; and was on the Burlington 'Hawkeye' at the time he entered the Signal Corps (now Weather Bureau). He rose through successive grades until appointed professor of meteorology in 1894 as a result of an open competitive examination against 23 of the ablest meteorological scientists of the country. He was assigned to the charge of the forecast district at Chicago; and in 1895 became chief of the Weather Bureau. He is a well known speaker and lecturer on meteorological subjects, and has published 'Moore's Meteorological Almanac and Weather Guide' (1901); and contributed to scientific magazines and other publications.

Moore, Zephaniah Swift, American educator, first president of Amherst college: b. Palmer, Mass., 20 Nov. 1770; d. 30 June 1823. He was graduated at Dartmouth College in 1793, entered the Congregationalist ministry, and preached at Leicester, Mass., from 1798 until 1811, when he was appointed professor of languages in Dartmouth College. He was chosen president of Williams College in 1815, but failing to procure the removal of the institution to the banks of the Connecticut, resigned in 1821, and was chosen president of Amherst College.

Moorehead, moor'- or mōr'hĕd, **Warren King,** American archæologist: b. Sienna, Italy, of American parentage, 10 March 1866. He was educated in public schools of Ohio, and devoted himself to the study of Indian archæology and later studied three years in the Smithsonian Institution, and was afterward engaged in investigations of the earthworks and other Indian relics in Ohio for four years. He had charge of the investigations in Ohio, Utah, Colorado and New Mexico for the Chicago exposition and was curator of the museum of the Ohio State University. He is at present curator in the department of archæology at Phillips Academy, and has published: 'Primitive Man in Ohio' (1892); 'Prehistoric Implements' (1900); etc.

Moore's Creek, a short stream in North Carolina, which flows into Cape Fear River about six miles above Wilmington. Moore's Creek is noted on account of a battle fought on its banks 27 Feb. 1776, between American and British forces. The British soldiers, nearly all Highland Scotch under Brig.-Gen. MacDonald numbered 1,500, and the Americans under Caswell and Lillington numbered 1,000. The charge was made by the British who tried to cross the stream on the girders of a bridge, the planks had been taken away, but the militia and minute men of the American force routed them. Fully 30 British were killed, many wounded, and about 500 taken prisoner. The victory gained by the Americans was an inspiration to the Carolinas; it had the same effect in the South that the Battle of Lexington had in New England.

Moore's Hill College, in Moore's Hill, Ind.; coeducational; opened in 1856 by Methodist Episcopals. In 1910 the college had 15 professors and instructors, 260 students, and about 6,000 bound volumes and 2,000 pamphlets in the library. The grounds, buildings and apparatus were valued at $35,000, the productive fund was $30,000, and the annual income about $13,000. The courses of study of the collegiate department lead to the degrees of A.B., B.S., and Ph.B.

Moor'fowl, a British name for certain grouse (q.v.) found on the Scottish moors; or for the European gallinule, commonly called moor-hen. See MUD HEN.

Moorhead, mōr'hĕd, Minn., city, county-seat of Clay County; on the Red River of the North, and on the Great Northern and the Northern Pacific Railroad; opposite Fargo, N. Dak. It is in a productive farming region in which wheat is one of the great crops. It has flour mills, grain elevators, foundries, machine shops, brick yards, and stock yards. It is a trade centre for a large part of Clay and Norman counties, and ships large quantities of wheat. It is the seat of Concordia College, the Sharp High School, a State Normal School, and has public and parish schools. The city owns and operates the electric-light plant and the waterworks. Pop. (1890) 2,088; (1900) 3,730; (1910) 4,840.

Moor'ish Architecture. See ARCHITECTURE, *Moslem*.

Moorish Art. See MOHAMMEDAN ART.

Moors (Lat. *Mauri;* Sp. *Moros;* Dutch, *Moors*), the people of Morocco. The Arabs who conquered Mauritania in the 7th century converted to Mohammedanism the native population, who in Europe were still called Moors, though in their own language they called themselves Berbers, while by the Arabs they were termed Moghribees, «westerners» or «men of the west.» Arabic manners and customs, and in a corrupt form the Arabic language, soon prevailed in the country, the Arab conquerors freely amalgamating with their converts, who far exceeded them in numbers. In 711 an army drawn from this mixed population, under Arab leaders, crossed the straits at Gibraltar, so named from their leader, and began the conquest of the Spanish peninsula. The Spaniards and Portuguese called these invaders Moors because they came from Mauritania, and the term Moors with them soon became synonymous with Mohammedans or Moslems, as the invaders designated themselves. The Spanish writers subsequently applied the term to all the Mohammedans of northern Africa; and when, at the close of the 15th century, the Portuguese made their way around the cape of Good Hope and encountered the Arabs on the coasts of East Africa and of Asia, they still called them Moors. Even the Turks, who in race, in language, and in everything but religion, were foreign and alien to both Moors and Arabs, were sometimes loosely spoken of as Moors by the Spanish historians.

Moos, mōs, **Salomon**, German aurist: b. Randegg, Baden, 15 July 1831; d. Heidelberg 15 July 1895. He studied at Heidelberg, Prague, and Vienna; in 1859 he became private docent at Heidelberg and in 1866 professor of aural surgery there. His most valuable researches were in relation to the diseases of the labyrinth of the ear, and he was the first to demonstrate that in certain infectious diseases, micro-organisms within the ear labyrinth cause derangement of hearing and equilibrium. He wrote ‘Klinik der Ohrenkrankheiten’ (1866); ‘Anatomie und Physiologie der Eustachischen Röhre’ (1874); ‘Über Meningitis cerebro-spinalis epidemica’ (1881); ‘Über Pilzinvasion des Labyrinths im Gefolge von einfacher Diphtherie’ (1887), ‘und im Gefolge von Masern’ (1888); ‘Histologische und bakterielle Untersuchungen über Mittelohrerkrankungen bei den verschiedenen Formen Diphtherie’ (1890). He also founded and edited with Knapp the ‘Zeitschrift für Ohrenheilkunde.’

Moose. The deer family (*Cervidæ*) embraces not only all the round-horned deer, but also the caribou and moose, whose horns are flattened in a manner known as «palmation.» Of this family, the American moose (*Alces americanus*) is the most colossal and also the most picturesque member. The moose of Europe and Asia, there called «elk» (q.v.), is a much smaller animal. Even in comparison with the largest American elk, our moose is a giant, and it is impossible to appreciate fully the great height and bulk, length of leg and size of antlers of this wonderful creature, without seeing a full-grown bull, either in his native wilds or mounted in a museum.

At nearly every point the species presents a peculiarity. The largest specimens ever shot and measured by naturalists stood from 78 to 84 inches in height at the shoulders. The body is very short in comparison with the great length of the legs, but the depth of the chest is unusually great. The end of the nose is flabby and pendulous, and overhangs the end of the chin by three or four inches. In browsing it is half prehensile, and is of great use in conveying twigs into the mouth. A moose in full winter pelage is covered by a coarse thatch of straw-like hair, from three inches in length on the body to six inches on the neck and shoulders. The color of the hair is purplish-gray, and for an animal which lives so far north, the pelage is exceptionally coarse and open.

The antlers of the moose are strikingly peculiar. The upper two thirds of the beam is enormously flattened, often to a width of 12 inches or more, and the upper end of this great shovel of solid bone terminates in a row of from six to twelve short points. The single brow-tine is also well palmated, and usually terminates in three or four long points of great strength. Occasionally the main shovel throws out sidewise a palmated spur of striking form and size, and such a head when seen from the front presents a chaotic jumble of tines and palmations. The largest antlers known are in the Field Columbian Museum, and have a spread of 78 inches, greatest width of palmation 16 inches, thickness of palmation 2⅛ inches, and a total of 34 points. The weight of the antlers and skull is 93¼ pounds. At least 25 pairs of antlers are known to exceed 70 inches in spread. The female has no antlers.

The moose is a browsing animal, and its favorite food consists of twigs of the willow, birch, hemlock, spruce, alder, aspen and maple. It also feeds upon moss, and in summer is very fond of wading in ponds and eating the stems and leaves of water-lilies. Because of their very unusual feeding-habits, moose are very difficult to rear in captivity to adult age. About 90 per cent die of gastro-enteritis before they attain the age of three years. For this reason, the market value of a live moose is far below its rarity and general desirability in a collection. Moose calves are born either singly or in pairs, in May or June. At birth an average specimen stands about 32 inches in height, and is a most grotesque-looking creature. Its first coat of hair is sandy red, like that of a buffalo calf. At 15 months old, a healthy young animal is about five feet high at the shoulders. The weight of a large adult male moose is between 1,100 and 1,200 pounds, but the maximum weight for the species would probably reach 1,500 pounds.

The range of the moose extends from Nova Scotia and New Brunswick to northern Alaska, a total distance along the axis of distribution of about 4,100 miles. In Maine, the average number of moose killed during 1900–3 appears to have been between 250 and 300.

The valley of the Ottawa River and its tributaries yet affords good hunting for moose, and so does northern Manitoba. The species still exists in small numbers in northern Minnesota, and along the western slope of the Rockies as far down as the head of Green River, Wyoming, its southern limit (lat. 43°). Northward, moose are found in British Columbia, Alberta, Athabasca, Yukon and in many portions of Alaska.

Those found on the Kenai Peninsula and north of Cook Inlet have the most massive and wide-spreading antlers to be found, and have even been described as an independent species, under the name of *Alces gigas*.

Everywhere throughout its range, the killing of moose is regulated by law. The open seasons are very short, the number that may be killed by each hunter is limited to one or two males, and the killing of females is forbidden. For the protection of the species in Alaska, Congress enacted in 1902 a stringent law, which will at least serve to prevent much of the reckless slaughter that up to that time had been proceeding. But, despite all laws that can be framed and enforced, the size of the moose, and its desirability, both as a hunter's trophy and for food, render it practically certain that the species will be destroyed far faster than it breeds, and that 25 years hence it will be as nearly extinct in America as the buffalo is to-day.

William T. Hornaday,
Director New York Zoological Park.

Moose-bird, one of the names in eastern Canada for the Canada jay. See Jay.

Moose-fly, a small biting fly (*Hæmatobia alcis*) parasitic on the moose and very annoying to that deer in the Northwest. It is closely related to the horn-fly (q.v.).

Moose Jaw, Canada, a town of Assiniboia, Northwest Territories, on the Canadian Pacific railway, 42 miles west of Regina. It is a division point on the railway and the terminal of the Soo branch, which runs southeast from Pasqua, through Estevan to the international boundary line at Portal, where it makes connection for Saint Paul. It has a large trade in stock and grain. Pop. (1901) 2,042; (1910 est.) 3,000.

Moose-wood, a local name in the Eastern States and Canada for either of two shrubby trees of whose leaves and twigs the moose is fond: (1) the striped maple or whistle-wood (see Maple); (2) leatherwood (see Cyrilla).

Moose'head, the largest lake in Maine, is on the boundary between Piscataquis and Somerset counties. It is about 35 miles long and its average width is about seven miles. A number of rivers flow into the lake, and its direct outlet is Kennebec River. Some of its waters enter the Penobscot by way of a short stream and the lakes which are the source of the Penobscot. The region around still retains many of its primitive features, game abounds, fish fill its waters, and but few people inhabit the region near the shores. The Canadian Pacific railroad passes along the southwest shore, and connects the villages of Greenville and Moosehead.

Moot. See Folkmoot.

Mop'sus, a legendary Greek prophet, son of Apollo, who vanquished Calchas in prophetic skill. Mopsus fell by the hand of the prophet Amphilochus. The name is also commonly used of the shepherd poets of Greek bucolic poetry, and hence of pastoral poetry generally.

Moquegua, mō-kä'gwä, Peru, a department in the southern part of the republic, bounded on the north by the department of Arequipa, on the east by Puno, on the south by Chile, and on the west by the Pacific Ocean. Area, 5,549 square miles. The eastern part is crossed by the Andes Mountains. The fertile portions of the department are on the mountain slopes, the region along the coast is a rainless desert. The chief products are brandy and wine. Pop. est. 50,970. (2) Moquegua, the capital, is southeast of the centre of the department. Pop. 6,125.

Moqui (mō'kē) **Indians,** a semi-civilized tribe living in northern Arizona. The first accounts of them date from the expedition of Coronado in 1540. Their history is strikingly similar to that of the Indians of New Mexico, except that after a successful revolt against the Spaniards, in 1680, they remained independent. They are kind-hearted and hospitable, cultivate the soil, raising grain and vegetables, and possessing large flocks of sheep and goats. They weave very fine blankets, an art which they have taught several neighboring tribes. The houses are built of stone, set in mortar, and for security are perched upon the summits of almost inaccessible mesas. They number about 1,600. See Indians.

Mora'ceæ, a family of trees and shrubs (rarely herbs), related on the one hand to the elms and on the other to the nettles, whose botanical characteristics are: flowers unisexual, usually with four perigone leaves; stamens straight or inflexed in the bud; ovary dimerous, with one suspended, anatropous ovule; stipules caducous; juice milky. The species are mainly tropical, and include the mulberries, figs, banyans, etc., bread-fruit, osage-orange, rubber or caoutchouc plants, upas tree (qq.v.) and others. The family is economically valuable in various ways.

Moradabad, mō-rä-dä-bäd', or **Muradabad,** India, the capital of a district of the Rohilkhand division, United Provinces of Agra and Oudh, 75 miles by rail east of Meerut on the Ramganga River. The town is of Afghan foundation, dating from 1625. It is noted for its inlaid metal-work in brass and tin, and for its chintz manufactures. It carries on a considerable trade in the agricultural produce of the district. It has a cantonment of native soldiers, two mosques, an Anglican church and an American Methodist mission. Pop. (1901) 75,176.

Moraes, José Prudente de, hō-sā proo-dăn'tā dā moo-rīs', Brazilian politician: b. Itú, São Paulo, Brazil, 1841; d. there 30 Nov. 1902. He studied law and entered early upon a political career and after the political uprising which deposed Dom Pedro was elected governor of São Paulo. He was president of the Constitutional Assembly and was elected president of the republic in 1894. Political troubles compelled his retirement for a short time in 1896, but he was re-elected and retained the office until 1898, when he was defeated by Campos Salles.

Moraine'. See Glacier.

Morais Saba'to, American rabbi and educator: b. Leghorn, Italy, 13 April 1823; d. Philadelphia 12 Nov. 1897. He was carefully trained in Hebrew lore and taught first in Leghorn and then for a few years in London. In 1851 he came to Philadelphia and until his death was minister of the Mikve Israel Synagogue. In 1867 he was appointed professor of biblical exegesis in the short-lived Maimonides

College of Philadelphia and was one of the founders and the first president of the Jewish Theological Seminary of New York. During nearly five decades of activity he was a representative of conservative Judaism, unremitting in his efforts in behalf of education and charity, an earnest and scholarly contributor to the Jewish press on historical, literary, and theological themes.

Moral Philosophy. See Ethics.

Morales, Luis de, loo-ēs' dā mō-rä'lās, Spanish painter: b. Badajoz about 1509; d. there 1586. His early artistic life was spent in Andalusia; but he removed to Madrid in 1564, where he remained for the rest of his life, returning to his native city only to die. He was essentially Spanish in his conception of religious art, from his devotion to which he was called «El Divino.» The main theme of his paintings was the Dead Christ, and the Mater Dolorosa. There is in them a blending of religious fanaticism with a sense of beauty which recalls the early Italian school, but his figures have the distorted and macerated air, which later became the accepted type in Spanish religious paintings. His drawing is monotonous and mannered, and his modeling such as to attenuate into half skeleton proportions the limbs and features, but his coloring is of sweet and melting tenderness. The Madrid Museum has several examples of this master, namely, an 'Ecce Homo,' a 'Mater Dolorosa,' and a 'Madonna.' A half-length figure of 'Christ Bearing the Cross' is in the Louvre under his name, and an 'Ecce Homo' of his hangs in the Dresden gallery.

Moral'ities, the name given a class of allegorical plays, so termed because they consisted of moral discourses in praise of virtue and condemnation of vice. The dialogues were carried on by such characters as Good Doctrine, Charity, Faith, Prudence, Discretion, Death, etc., whose discourses were of a serious cast. Moralities were occasionally exhibited as late as the reign of Henry VIII. See Drama.

Moran, mō-rän', **Edward,** American painter: b. Bolton, Lancashire, England, 19 Aug. 1829; d. New York 9 June 1901. He was a pupil of Hamilton and Weber in Philadelphia and in 1862 went to Europe, where he studied in France and England for seven years. He afterward made his permanent home in New York. His best known pictures are marines, such as 'Outward Bound'; 'Launch of the Life-Boat' (1865); 'The Coming Storm in New York Bay'; etc. His historical series, representing epochs in American seafaring from the 'Landing of Leif Ericson' (1001) to 'Dewey's Return,' was completed in 1899.

Moran, Patrick Francis, Australian Roman Catholic archbishop and cardinal: b. Leighlinbridge, Ireland, 16 Sept. 1830; d. Sydney, Australia, 16 Aug. 1911. He was educated at the Irish College of St. Agatha in Rome. In 1856 he was professor of Hebrew in the College of the Propaganda in Rome and in 1872–84 he was bishop of Ossory. In 1884 he was elevated to the rank of third archbishop of Sydney and he became first Australian cardinal in 1885. He published 'Acta S. Brendani' (1872); 'Irish Saints in Great Britain' (1879); 'The Reunion of Christendom and Its Critics' (1896); 'Letters on the Anglican Reformation' (1890); 'History of the Catholic Church in Australasia' (1894); etc.

Moran, Peter, American artist: b. Bolton, Lancashire, England, 1842. He belongs to an artistic family being brother of Thomas Moran and of Edward Moran, both painters of reputation; he became their pupil at Philadelphia and chose landscape and animal life as his special department. Among his paintings are: 'Return of the Herd,' to which a medal was awarded at the Centennial Exhibition; 'Santa Barbara Mission'; and 'Pueblo of Zia, New Mexico.' He is also successful as an illustrator and etcher and at the Centennial of 1876 received a medal for his etchings of animals. He has two sons of rising reputation as artists.

Moran, Robert, American manufacturing machinist: b. New York 1857. At 14 he went to Cincinnati, where he worked in the rolling mills, spending his spare time in study; and three years later made his way from Cincinnati to New York, thence to San Francisco, and finally to Seattle, where he became fireman on a Sound steamer, instructed himself in mechanical drawing, rose to be chief engineer and pilot, and then with his brothers opened a machine shop. He obtained the contract for the navy yard pumps at Port Orchard; lost his entire establishment by the great Seattle fire of 1889, when as mayor he neglected his own property to oversee fire-fighting throughout the city; but immediately rebuilt; and in 1896 contracted for the U. S. torpedo boat Rowan, on which he exceeded the contract speed.

Moran, Thomas, American painter: b. Bolton, Lancashire, England, 12 Jan. 1837. He began the study of landscape painting at Philadelphia in 1856. In 1861 he visited Europe and copied some of Turner's paintings. When Professor F. V. Hayden visited the Yellowstone River he accompanied the expedition (1871) and in 1873 went with Major Powell to the Colorado. From the studies and sketches he then made he painted his 'F. V. Hayden's Expedition to the Yellowstone' and the 'Chasm of the Colorado,' now in the capitol at Washington.

Morava, mō'rä-vä, Servia, a river about 250 miles long, formed by the confluence at Staladsh of its headstreams, the western Morava rising near the southwest boundary, and the southern Morava, with its source in Kossovo, Turkey. It is the largest river in Servia and is navigable 50 miles from its mouth in the Danube River, 30 miles east of Belgrade.

Morava, a river of Austria-Hungary. See March.

Mora'via (German, *Mähren*), Austria-Hungary, a western province bounded north by Prussia, northeast by Galicia, east and southeast by Hungary, south by Hungary and Austria, and west by Bohemia; area, 8,584 square miles. Moravia proper consists of a large basin surrounded by mountains, on the north the Sudetes, on the east the Carpathians, and on the west a low range of hills which gradually ascends towards the north until it unites with the Sudetes, and open only on the south, at a central point, toward which all its slopes converge and all its drainage is carried. Its climate is milder and more genial than that of most European countries under the same latitude.

Moravia belongs to the basin of the Danube, all the smaller streams falling into the March or Morava, a tributary of the Danube. The minerals are of considerable importance, and include silver, lead, copper, iron, coal, graphite, etc. The soil is generally fertile, and all the ordinary cereal, leguminous, and root crops are raised in abundance. Flax of excellent quality is extensively grown in several districts, and fruit is so abundant that many parts of the country have the appearance of one great orchard; but the favorite culture is that of the vine, for which both the soil and exposure of the province are admirably adapted. The pastures, in general excellent, occupy a large extent of surface. The rearing of cattle, nevertheless, gets comparatively little attention, and is not sufficient to meet the home demand. Sheep, on the other hand, are reared in abundance, and are of good quality. They have been much improved by judicious crossing with the merino, and furnish a wool to the excellence of which the woolen manufactures of the country owe their prosperity. The horses, too, are of a strong, hardy, active breed, and are much used in the Austrian service for heavy cavalry. Manufactures have made great progress, and in all the great branches of industry — in iron and ironmongery, leather, linen, cotton, and woolen tissues, particularly the last — Moravia takes precedence of most of the provinces of the empire. Other manufactures deserving of notice are silk, glass, paper, potash, tobacco, and beet-root sugar. The trade in most of these articles is of considerable importance. In 1898 Moravia possessed 1,220 miles of railway, 2,478 miles of telegraph lines, and 7,083 miles of roads; its waterways are practically unimportant. About 70 per cent of the inhabitants are of Slavonian extraction, and 26 per cent Germans, the latter found mostly in the towns and on the borders. The language chiefly spoken and called Moravian is merely a Slavic dialect; German, however, is generally understood by all classes. The religion generally professed is Roman Catholic. Elementary education is generally diffused, and numerous gymnasia furnish education of a very superior order. There are theological colleges at Olmütz and Brünn (qq.v.), the latter city, the capital of the province. Moravia was anciently inhabited by the Marcomanni and Quadi, afterward by the Rugii, and still later by the Longobardi. It was finally occupied by a colony of Slavs, who took the name of Moravians from the river Morava. In 1029 Moravia was united to the kingdom of Bohemia, with which it had the same constitution, administration, and laws. In 1197 it was erected into a margraviate, with a separate court and a separate administration. With Bohemia it passed to the house of Austria in 1527. Moravia sends 36 members to the Austrian house of deputies. (See AUSTRIA, *Constitution.*)

Moravian Church, The, the common name given in England and America to the renewed Unitas Fratrum or Church of the Brethren — for a time styled also in English, the Church of the United Brethren — which originally flourished in Bohemia, Moravia and Poland, was disrupted and suppressed in the 17th century, was resuscitated in Saxony in the 18th century and at present exists in its reorganized form in Europe and America with an extensive mission work in many parts of the world. It was a product of the evangelical movement led by the Bohemian reformer, John Huss, who suffered martyrdom at Constance 6 July 1415. It developed out of an association formed in 1457 near Kunwald in northeastern Bohemia to foster pure Christian teaching and life within the National Church. Its attitude toward the abuses of the time and its rapid growth caused it soon to be put under proscription by the authorities. Drastic measures intended to suppress and disintegrate it had the contrary effect. It formed a more compact union, perfected its organization and gradually became a distinct Church with its own ministry, established through the good offices of Waldensian bishops who conveyed the historic episcopate to it in 1467. A system was developed which followed primitive Christianity in its elementary principles. It began with the Congregation as the unit, based on Scripture, bound by a Brotherly Agreement and governed by an elected eldership. With the increase of congregations, the Synod was formed, legislating by delegated authority. The Synod committed executive control to the Council which was also elective and representative, for while the episcopacy stood at the head, the presbytery and the laity had a voice in it, with the central principle of conferential government and collegiate administration fixed. This principle, inherited with the ancient episcopate, is cardinal in the modern structure of the Church, adjusting together conceptions of polity commonly regarded as opposites and presenting affinities to widely divergent church types.

Its history during the ancient period is to a great extent one of cruel persecution. Its speedy recuperation after such ordeals and its increase during intervals of peace were phenomenal. When the German Reformation began in 1517, the Bohemian and Moravian Brethren numbered nearly 200,000 with about 400 places of worship. In the baronial castle and in the peasant's cottage loyalty to their Church, which embodied the best ideals of the nation, rendered them amenable to a discipline in which they stood pre-eminent and made them a strong moral power to be coped with by ecclesiastical and political authorities. In their highest ascendency they led the educational and literary activity of the regions in which they were established. Their formulated conceptions of Christian doctrine were a gradual growth. Their last and most mature confession of faith before the overthrow of the Church in its original seats was published in 1573.

The Counter-Reformation inaugurated by Ferdinand II. in 1621 brought the organized existence of the Church to an end in Bohemia and Moravia, subjected many of its members to martyrdom and drove thousands into exile. It was excluded from the terms made to other evangelical parties in the Peace of Westphalia which ended the Thirty-Years' war in 1648, and the hope of its resuscitation in its home-lands was crushed. The parishes of its Polish province, founded in 1548, maintained an organized existence much longer, but they were gradually absorbed by the Reformed Church of Poland of which ultimately even the clergy in whose persons the episcopate of the Unitas Fratrum was being perpetuated in the hope of its renewal were legally recognized ministers.

The first step in the restoration of the Church occurred in 1722, when a little company of refugees from Moravia were given an asylum by Nicholas Lewis, count of Zinzendorf, on his estate Berthelsdorf in Saxony where, on 17 June of that year, they began a settlement which was called Herrnhut. Many others from Moravia, Bohemia and different parts of Germany joined them during the next few years, and a gradual process of organization took place in which the plans of the Moravians were merged with those of Zinzendorf who had in view rather an Evangelical Association harmonizing different confessional affiliations and church traditions, with the necessary adaptation of the whole to its situation within the pale of the state church. The doctrinal articles of the Augsburg Confession were adopted and concessions from the Saxon and Prussian governments permitted the establishment of Moravian Church order and constitution modified to suit the new conditions.

The Moravian episcopate was transferred to the new organization on 13 March 1735, when David Nitschmann was consecrated a bishop at Berlin by Bishop Daniel Ernst Jablonsky with the written concurrence of Bishop Christian Sitkovius of Lissa, they being the last two surviving bishops of the old line. A notable spiritual experience which marked the year 1727, when the first definite organization took place at Herrnhut, produced an intense zeal for evangelization. The result, during the next few years, was the establishment of other congregations on the continent of Europe, the founding of the Church in England and America and the missions to the heathen which have chiefly given the Church its reputation. The first such mission was begun in 1732 on the Island of Saint Thomas, West Indies.

The first Moravian evangelist came to Pennsylvania in 1734. The first settlement in America and mission to the Indians was founded at Savannah, Ga., in 1735. Untoward political conditions caused its abandonment in 1740 and the removal of the colonists to Pennsylvania, where a permanent settlement arose in the present Northampton County, with organized activity in Philadelphia and New York and an extensive itinerary among white settlers and Indians. The Moravian pioneers in "the Forks of the Delaware" first located on a tract of land which the evangelist George Whitefield had purchased and named Nazareth, where he proposed to found a village and a negro charity school. This property came into possession of the Moravian Church in 1741. On another tract at the confluence of the Monocacy Creek and the Lehigh River its chief settlement was founded in that year and at Christmas 1741, when Count Zinzendorf was at the place, it received the name Bethlehem. In June 1742, a considerable colony from Europe joined the pioneers and the settlement was regularly organized. The population was divided into an itinerant and a local congregation, the former to engage in gospel work among white settlers and Indians, the latter to develop the settlement and provide support for the missionaries. Thus, from the first, Bethlehem was the centre of the Moravian Church in America and of its various activities.

Until 1762 a co-operative union was maintained at Bethlehem and Nazareth which was called the General Economy. All labored for a common cause and received sustenance from a common stock, but there was no surrender of private property and no obligation which prevented the individual from withdrawing when he chose. Numerous colonies came to America during those years on vessels owned and managed by the Church and under the arrangement which existed results were accomplished which would not otherwise have been possible. The material benefits of the settlement were appreciated by the authorities of Pennsylvania, and the spiritual activities prosecuted by the Moravians, although misunderstood and opposed by some, as was the case also in Europe, were epoch-making in the religious growth of the country.

Two notable lines of effort in colonial times, in addition to the Indian missions, were the propagation of Zinzendorf's idea of evangelical alliance and denominational federation, and religious education of children. Desiring to diminish rather than increase denominational divisions the leaders of the Church generally refrained from organizing distinctly Moravian congregations and in consequence of this policy the Moravian Church remained numerically a small body. The European plan of the Church to concentrate in exclusive settlements to some extent, was followed for a full century. Besides Bethlehem and Nazareth, such church-villages, founded prior to the Revolutionary War, were Lititz in Lancaster County, Pa., Hope in Sussex, now Warren County, N. J.,— abandoned in 1808 — and Salem, now a part of Winston-Salem in Forsyth County, N. C., the central settlement on a large tract of land purchased of the Earl of Granville and named Wachovia. These places continued long to be conserving centres of all that was distinctive in the religious and social life of the Moravian Church, as fostered under the influence of Zinzendorf's ideas and methods, presenting interesting experiments in municipal government, industrial order and general culture. They are yet the seats of widely known educational institutions, all founded in the 18th century. A few of the town and country congregations organized in colonial times, without the peculiarities of the church settlements, are yet in existence. During the years from 1844 to 1856, the exclusive system was entirely abolished by all of the Moravian villages in America and their unique character rapidly disappeared. At that period active home mission work was revived and since then many congregations have been founded in various parts of the United States. The most fruitful of these efforts have been in several of the northwestern states.

The Moravian Church has no peculiar doctrines. It is simply and broadly evangelical, in harmony with other Protestant denominations on the cardinal doctrines of Christianity, and bound by no articles on the points of difference. Its only prominent doctrinal feature is the strongly Christ-centred tendency of its teaching which pervades its official statements, its liturgy and its characteristic preaching. The digest ("Results") of the General Synod, the catechisms, and the Easter Morning Litany sufficiently set forth the doctrinal position of the Church. The Church has an established liturgical system, with a litany used regularly on the Lord's Day, and a variety of offices for different church seasons, in which special prominence is given to singing; the cultivation of church music having always been a conspicuous feature of the Moravian cultus. The general order of the ancient church year is observed in the services. Of distinctive services retained by some congregations, the love-feast, introduced in 1727 in imitation of the Agapæ of the Apostolic Church, is the most conspicuous. Moravian orders of the ministry are bishops, presbyters, and deacons. A diocesan episcopacy does not exist. The bishops are, as such, everywhere on a parity, representing the entire Unitas Fratrum. They are *ex officio* members of the General Synod and of the Synods of the several provinces in which they reside. Besides having the exclusive function of ordaining men, they are looked to as preeminently the guardians of sound doctrine and established order. In governing boards they officiate, not by virtue of episcopal authority, but by election, and those who do not occupy executive positions serve, meanwhile, in pastorates. The Moravian Church in America is divided into a Northern and a Southern Province, constituting, with the British and German branches of the Church, an organic unity under the General Synod. The legislative authority of each Province is the Provincial Synod which elects an Executive Board known as the Provincial Elders' Conference and composed usually of a bishop and two presbyters. The Northern Province is divided into Districts, each organized with its Synod and its Executive Board. The communicant membership of the American Church in 1910 was 17,572 and its total 25,000. The enrolment in the 14 mission provinces of the Church was 98,599 and its grand total in all countries was 138,903, besides 70,000 members of the state churches of Europe, ministered to by Moravian home missionaries.

J. M. Levering,
Bishop of the Moravian Church.

Moravian Seminary, at Bethlehem, Pa., founded almost at the beginning of the Moravian settlement of Bethlehem (1741), it is the second oldest girls' boarding school in the United States, the Ursuline Academy, New Orleans (7 Aug. 1727), being the first. «Colonial Hall,» built in 1748, is the oldest structure in the group of buildings owned by the Seminary. From the roof of this building it was customary in pre-Revolution days to play the trombone on festal occasions or to announce the death of members. Tradition says that on one occasion during the French and Indian War, a band of Indians had planned to attack the settlement, and at sunset as they lay waiting on Calypso Island, for the darkness, they heard a strange melody floating down from the sky. They had never heard anything like it before, and thinking it must be the voice of the Great Spirit warning them, they held a hurried council, and silently stole away in the darkness. In 1776–8, «Colonial Hall» served as a military hospital for the Continental troops. After the Battle of Brandywine the place was crowded with wounded. On the slope of the hill, just west of Monocacy Creek, are the graves of over 500 of unknown dead. Many of the distinguished women of the nation have graduated at this institution. A preparatory school, music, art, and science departments are connected with the seminary. The average attendance is about 100, the number of teachers 20. (See Bethlehem, Pa.) Consult Longfellow's poem, 'Hymn of the Moravian Nuns.'

Moravians, See Moravian Church.

Moray, mŭr'ā, **Earl of.** See Stuart, James, Earl of Murray or Moray.

Moray Firth, Scotland, a large bay on the northeast coast, containing at its widest extent the sea enclosed by a line running from Dunscansby Head in Caithness-shire to Kinnaird Head in Aberdeenshire. It thus comprises the Dornoch Firth and the inner Moray Firth, the entrance to which lies between Tarbet Ness in Cromarty and Burghead in Elginshire, and which gives off Cromarty Firth and Beauly Firth and Loch. The opening of the outer firth to the North Sea is 80 miles in width. The rivers which enter the firth include the Deveron, Spey, Findhorn, Ness, Beauly, Oykel, etc.

Mo'rays, eel-like fishes of the family *Murænidæ*. These, says Jordan, may be distinguished by the small round gill openings and the absence of pectoral fins. The skin is thick and tough, the narrow jaws are armed with knife-like or else molar teeth, and the lower one is moved by muscles of extraordinary size and power. They are carnivorous and pugnacious fishes, and some of them, which reach a length of five or six feet, may be dangerous to bathers and fishermen. They abound in the tropics, lurking in the crevices of rocks, coral-reefs, and similar places, and most of them are colored in striking patterns, as fine marblings of black on lustrous green, or varied spottings. Several genera and more than 100 species are known, of which a celebrated type is the muræna (*Muræna bellina*) of the Mediterranean Sea, which was extensively cultivated by the Romans, in the classic period, for the sake of its flesh. Two or three species are well-known as food-fishes on both coasts of tropical America, and one usually called «conger,» is similarly utilized in Southern California.

Morazan, Francisco, frän-sēs'kō mō-rä-sän', Central American soldier and politician: b. Tegucigalpa, Honduras, October 1792; d. San José, Costa Rica, 15 Sept. 1842. He early entered political life and in 1824 was secretary-general of Honduras; when Honduras and Salvador revolted against President Arce of Central America Morazan came rapidly to the front as a military leader and in 1830, after a series of brilliant military exploits, was elected president of Central America. Though a wise ruler his administration was interrupted by several revolts and at the close of his second term it was found that no provision had been made for electing his successor and in spite of his efforts the union of the states of Central America was dissolved and Morazan was compelled to find refuge in Peru. In 1842 he landed in Costa Rica, proclaimed the federation of the states and after defeating Carillo assumed the presidency at San José. A revolution followed and he was captured and shot. Consult Bancroft, 'History of Central America,' Vol. III. (1887).

Mordant, in dyeing, a substance which is capable of penetrating the fibres of the substance that is to be colored, or of forming an insoluble deposit upon them, and which also forms an insoluble compound with the dye that is to be used. Mordants vary greatly in character, according to the nature of the dye and of the fabric. They may be classified, however, as "acid" and "basic"; an acid mordant being required to fix a basic dye, and a basic mordant to fix an acid dye. Tannic acid is a typical example of an acid mordant. Cotton may be mordanted with this substance by soaking it in a solution of tannic acid, and then passing the fabric through a solution of a salt of antimony, tin, or some other suitable base, by which the tannic acid is fixed upon the fibre in the form of an insoluble tannate, with which the dye subsequently combines. The acetates and sulphates of aluminum and of iron may be cited as examples of basic mordants. Wool may be mordanted, for example, by boiling it in a dilute solution of such a salt (usually with the addition of certain other substances such as cream of tartar or oxalic acid), the wool causing the mordant to partially dissociate, so that a more basic compound is deposited upon and within its fibres, while a more acid one remains in solution. Wool, when treated in this way, will fix dyes (such as alizarin) that are of a phenolic character. The precise phenomena that occur in mordanting are not thoroughly understood in all cases. See DYEING.

Mordecai, mŏr'dĕ-kī, **Alfred**, American engineer: b. Warrenton, N. C., 3 Jan. 1804; d. Philadelphia 23 Oct. 1887. Graduating at the head of his class from West Point in 1819, he became 2d lieutenant of engineers, and after work as instructor at West Point and assistant engineer was appointed captain of ordnance corps 30 May 1832. He was assistant to the chief of ordnance at Washington 1838–42 and member of the ordnance board 1839–60. Brevetted major (1848) for meritorious conduct in the Mexican War, he was sent to the Crimea (1855–67), his observations on military organization and ordnance being published by order of Congress in 1860. He resigned from the service in 1861, settling in Philadelphia, where, after acting as assistant engineer of the Mexican & Pacific Railroad (1863–6), he became (1867–1887) treasurer and secretary of canal and coal companies controlled by the Pennsylvania Railroad. Among his works are: 'Digest on Military Laws' (1833); 'Reports of Experiments on Gunpowder' (1845–9); 'Artillery for the U. S. Land Service,' as devised and arranged by the Ordnance Board with Plates (1849); 'Ordnance Manual for the Use of Officers of the U. S. Army' (1841 and 1850).

Mordecai, Alfred, American engineer, son of the preceding: b. Philadelphia 30 June 1840. On graduating from West Point (1859) he was brevetted 2d lieutenant of topographical engineers. After service on the field (June–August 1861) he taught at West Point for nearly a year, and then was promoted until he became chief of ordnance, Department of the South (1863–4). From May to September 1864 he was chief of ordnance, army of the James, later holding similar office in the army of Ohio, army of the Cumberland and military division of the Tennessee. Brevetted lieutenant-colonel for services in the war (13 March 1865), he was instructor of ordnance and gunnery at West Point 1865–60, and again 1874–81. He was commander, with rank of colonel, of the Benicia (Cal.) Arsenal 1899–1902; promoted brigadier-general and retired in January 1904.

Mordenite, a native hydrous silicate of aluminum, potassium, sodium and calcium, occurring in small monoclinic crystals, or in small hemispherical concretions with a fibrous structure. It is white, or nearly so, with a vitreous lustre. Mordenite occurs at Morden, N. S., and in western Wyoming.

Mordvins, môrd'vĭnz, a race of people inhabiting European Russia, and belonging to the Bulgaric or Volgaic group. Their chief sources of livelihood are cattle-rearing, hunting, fishing, and bee-keeping. Since the time of the Empress Anna they have been gradually converted to Christianity. Their numbers are estimated at 480,000.

More, mōr, **Hannah**, English moralist: b. Stapleton, near Bristol, 2 Feb. 1745; d. Clifton, near Bristol, 7 Sept. 1833. She was educated in the Seminary in Bristol kept by her elder sisters, and her talents early made her acquainted with Johnson, Burke, Garrick, and other literary men of the period. Her first success was as a dramatic writer. 'The Inflexible Captive'; 'Percy'; and 'The Fatal Captive' were successfully brought out through the patronage of Garrick and her other friends. After the production of the last in 1779 she gave up play writing from religious motives, and devoted herself to writing works of a moral and religious tendency, the diffusion of tracts, and other philanthropic labors. In this new course her talents commanded an extraordinary measure of success. A series of tracts called the 'Cheap Repository,' commenced at Bath in 1795, is said during the first year to have had a circulation between 1,000,000 and 2,000,000 copies. Her 'Strictures on the Modern System of Female Education' appeared in 1799, followed by 'Hints Towards Forming the Character of a Young Princess' (1805); 'Cœlebs in Search of a Wife' (1809); 'Practical Piety' (1811); 'Christian Morals' (1812); 'Character and Writings of St. Paul' (1815); 'Moral Sketches of the Prevailing Opinions and Manners, Foreign and Domestic, with Reflections on Prayer.' Consult: Roberts, 'Life of Hannah More'; Thompson, 'Life of Hannah More' (1838); 'Correspondence of Hannah More with Zachary Macaulay' (1860); C. M. Yonge, 'Hannah More' (1888); Marion Harland, 'Literary Hearthstones: Hannah More' (1900).

More, Nicholas, English colonist: b. England; d. Philadelphia, Pa., 1689. He was a physician and left a promising career in England to come with William Penn to America in 1682. He was from the first prominent in the affairs of the colony, was president of the first assembly in 1682, and in that year presiding judge of the courts of Philadelphia. In 1683 he was clerk of the provincial council and the next year was speaker of the assembly. He was appointed first chief justice of the supreme court of the province in 1684, and in this position incurred the disapproval of the colony and was impeached for having wielded "an unlimited and arbitrary power." He retained the confidence of Penn, however, who appointed him in 1686 one of the five commissioners in control of the government.

More, Paul Elmer, American author: b. St. Louis, Mo., 12 Dec. 1864. He was graduated at Washington University in his native city in 1887, studied later at Harvard and was instructor in Sanskrit there for a year and subsequently at Bryn Mawr for two years. He has published 'The Great Refusal'; 'A Century of Indian Epigrams: chiefly from the Sanskrit of Bhartrihari' (1898); 'The Judgment of Socrates'; 'Life of Benjamin Franklin'; 'Translation of the Prometheus Bound of Æschylus'; etc.

More, Sir Thomas, English statesman and author: b. London 7 Feb. 1478; d. there 6 July 1535. In 1492–4 he studied at Canterbury College, now Christ Church, Oxford, and in 1494 was a student in Lincoln's Inn. At 21 he obtained a seat in Parliament, and distinguished himself with spirit in opposition to a subsidy demanded by Henry VII. After being admitted to the bar he enjoyed great reputation as a pleader. In 1516 he accompanied the commissioners sent to renew the alliance between Henry VIII. and Charles, then archduke of Austria, and showed much ability. In 1518 he published his celebrated political romance 'Utopia.' Cardinal Wolsey pressed him to receive a pension, which he refused as inconsistent with his official duties; but he was induced to accept the place of master of requests. He was shortly after knighted, and taken into the privy-council. In 1520 he was appointed treasurer of the exchequer, and in 1523, at the instance of Wolsey, was elected speaker of the House of Commons. He was joined with Wolsey in a mission to France in 1527 and on his return made chancellor of the duchy of Lancaster. In 1530 he succeeded the cardinal as lord high-chancellor, which office he filled for three years with scrupulous integrity. Unable to acquiesce in the king's wishes respecting his divorce from Catharine of Aragon, he obtained permission to resign the seals. The affront rankled in the mind of Henry, and was further inflamed by his refusal to attend the coronation of Anne Boleyn. An attempt made to implicate him in the practices of Elizabeth Barton altogether failed; and he also perfectly cleared himself of the charge of inducing the king to publish the book against Luther, in which the Pope's authority was held forth — a doctrine now found inconsistent with the intended attack on the Roman See. At length the oath of supremacy being required by act of Parliament Sir Thomas More was cited before the council to take it; and in spite of all attempts of Cranmer and others to induce him to compliance, he persisted in a refusal to act in opposition to the dictates of his conscience, was consequently committed to the Tower, and was indicted for treason. After an imprisonment of 12 months, he was brought to trial, and despite his eloquent defense condemned and sentenced to be hanged and quartered. The king altered the sentence from hanging and quartering to beheading, and this act of grace More received with his usual vein of humor. At his execution he deported himself with a great degree of good humor. The news of his death startled Catholic Europe, and British ambassadors were instructed to explain that all was done by due legal process. More's learning was various and extensive; his wit abundant, and his elocution ready and agreeable. He wrote elegant Latin prose and verse, and a terse and simple English. He is regarded as among the noblest characters of history. The second degree of beatification, that of Blessed, has been conferred on More by the Roman Catholic Church. His English works were published collectively, in 1557, and his Latin in 1567. Consult: the biographies by Roper (1626, reprinted 1716); Stapleton, 'Tres Thomæ' (1588); Mackintosh, 'Life' (1830–44); Bridgett, 'Life of Blessed Thomas More' (1891); Campbell, 'Lives of the Chancellors' (1845–8); Bremond, 'Thomas More' (1905).

More'a. See Peloponnesus.

Moreau, mō-rō, Gustave, French painter: b. Paris 1826; d. there 19 April 1898. He began his career under the influence of Delacroix, but on going to Rome he chose as his especial subjects of study the fantastic architectural effects of Mantegna and the dramatic composition and sometimes violent poses of Luca Signorelli. His works show the characteristics of these masters and are eminently original both in design and coloring, though little known until the latter days of his life, as he seldom exhibited until he was past forty, or offered his works for sale. On his death he left upward of 800 canvases to the municipality of Paris to form the Musée Moreau. In 1892 he was appointed professor in the Ecole des Beaux-Arts and held the position till his death. His most notable pictures are 'Death and the Young Man' (1865); 'Orpheus' (1867) in the Luxembourg; 'Prometheus' (1869); 'Hesiod and the Muses' and 'The Apparition' the last two in the Luxembourg also.

Moreau, Jean Victor, zhŏṅ vēk-tōr, French general: b. Morlaix Finistère, 11 Aug. 1763; d. Laun, Bohemia, 2 Sept. 1813. His father was a lawyer and the son, apparently against his will, studied law and held a post in the justiciary at Rennes. But at the beginning of the Revolution he entered politics, formed a company of the National Guard and in 1791 was elected lieutenant-colonel of a volunteer battalion which joined Dumouriez in the field. He rose rapidly, replaced Pichegru in 1795 as commander of the Army of the North, and in 1796 was put at the head of the Army of the Rhine and Moselle. His retreat before a superior force after Jourdin's defeat at Würzburg, and his swift movement to the attack again before the truce of Leoben proved him a masterly strategist. Momentarily retired for failure to reveal Pichegru's royalist plot he was recalled in 1799; served under Scherer in Italy and largely recouped his superior officer's losses; succeeded Joubert after that general's death; was Bonaparte's confidant in the *coup d'état* of Brumaire; passed the Danube and the Rhine; defeated the Austrians in a series of brilliant engagements culminating in Hohenlinden; and then with the backing of the royalists attempted to oust Bonaparte. He was found guilty of plotting against Napoleon and was exiled from France for two years, which he spent on a farm in Pennsylvania. He was recalled to Europe by the Allies, served against France in 1813, and was killed at the battle of Dresden.

Morecambe, mōr'kăm, **England,** a Lancashire seaside resort on Morecambe Bay, 4 miles by rail northwest of Lancaster. Its principal features are the 'promenade pier,' observation tower, winter garden, etc., and the fine beach of Morecambe Bay, this inlet of the Irish Sea being about 17 miles long and 10 miles broad. Pop. about 13,000.

Moreen'. See MOIRE.

Morel. See FUNGI.

More'land, William Hall, American Protestant Episcopal bishop: b. Charlestown, S. C., 9 April 1861. He was graduated from the University of the South in 1881 and was assistant rector at Christ Church, Hartford, Conn., in 1884–5. In 1885–93 he was rector at the Church of the Good Shepherd, Nashua, N. H., and in 1893–9 rector of St. Luke's, San Francisco. He was consecrated bishop of Sacramento in 1899. He has published: 'What is Christianity?' (1887); 'The Church or the Churches: Which?' (1894); etc.

Morelia, Mexico, capital of the state of Michoacan, situated on the line of the National railway, 234 miles west from the city of Mexico, elevation 6,314 feet above the sea, distant by straight line from the nearest point on the Pacific ocean about 140 miles. The city was founded in 1541 and known as Valldolid until 1828, when it was given the name of Morelia in honor of Morelos (q.v.) the patriot and soldier, who was a native of the city and who rendered important service in the cause of independence. The most notable monument in the city was erected to his memory many years ago, and another, to cost $80,000, is soon to be erected. Morelia is in the centre of a productive valley which is almost surrounded by mountains; is on the border of an important sugar producing section, and is surrounded by climatic conditions favorable to the successful cultivation of nearly all grains, fruits and vegetables. Patzcuaro lake, the most beautiful body of water in the republic, is only 39 miles to the southwestward. The city has been the capital of the state since 1821. The College of Saint Nicholas, which is claimed to antedate any other in the republic, is the leading educational institution. It was founded in Patzcuaro three centuries ago by the first archbishop of Michoacan, and was originally devoted wholly to professional study. The General Hospital, a noble institution of striking architectural beauty and large capacity, is also the home of the School of Medicine. A charity hospital for women is conducted under the supervision of the archbishop of Michoacan. An academy for young girls occupies an imposing building formerly used as a nunnery. There are several libraries, the principal ones being the State Library, which contains a remarkable collection of rare old books of great value, and the libraries of the College of San Nicolas, the Collegio Seminaria, the Military School of Arts and Industries, and the Supreme Court. There are several other smaller ones. The aggregate number of volumes in these libraries, according to the government reports, is over 70,000. The great Cathedral, which is one of the most notable in the republic, was begun in 1640 and completed in 1741 and is a very imposing edifice. A stone aqueduct of exceeding beauty supplies water for domestic purposes It was built in the latter part of the 18th century by Archbishop Antonio de San Miguel. There is no manufacturing except in a small way, the specialty for which the city is noted being a very high class of confectionery made of the fruits of the section. Extensive barracks for the use of national troops — both infantry and cavalry — have recently been built a short distance southeast of the city. The financial needs of the community are supplied by the bank of Michoacan, capital $600,000, branches of the National Bank and the Bank of the State of Mexico, and an agency of the Bank of London and Mexico.

Morelos y Pavon, Jose Maria, hō-sā' mä-rē'ä mō-rā'lōs ē pä-vōn', Mexican patriot: b. near Apatzingan, Michoacan, 30 Sept. 1765; d. near City of Mexico 22 Dec. 1815. He worked for many years as a muleteer; at 32 entered the college of Valladolid; was ordained to the priesthood three years afterward; and from 1801 to 1810 was in charge of the parishes of Caracuaro and Nucupetaro. In 1810 he joined the standard of rebellion raised by Miguel Hidalgo, who had been rector of the college of Valladolid during Morelos' student days, and after Hidalgo's death kept the cause alive in the North by his own vigorous movements in the South. Having defeated several Spanish armies he advanced upon the City of Mexico, defeated Porlier 22 Jan. 1812, successfully held Cuautla for 62 days against the famous siege by the viceroy, and captured Oaxaca (October 1812) and Acapulco (August 1813). He was made captain-general in November 1813 by the Congress convened at Chilipancingo, and the declaration of Mexican independence soon followed. He attempted to capture Valladolid, was defeated by Iturbide, was captured, and was shot from the rear as a traitor at San Cristobal Ecatepec. He was an able general and is a popular hero in Mexico, where one state and several districts bear his name.

Morelos, a state of Mexico. See MEXICO — THE STATES OF.

Moreno, Afredo Baquorizo, ăl-frā'dō bă-kwō-rē'sō mō-rā'nō, Ecuadorian diplomatist and novelist: b. Guayaquil, Ecuador, 29 Sept. 1859. He was graduated in law from the University of Quito and began the practice of his profession in 1884. From 1897 to 1901 he was a member of the Superior Court of Guayaquil, was minister of foreign relations 1901–2, was elected vice president of Ecuador in January 1903, and is now minister from Ecuador to the United States. He is the author of 'Poetas' (1882); and the novels 'Titania' (1892); 'El Senor Peneo' (1892); 'Una Sonata en Prosa' (1894); 'Evangelina' (1895); 'Luz' (1901).

Moreton (mōr'tōn) **Bay,** Australia, on the east coast of Queensland, formed inside the islands of Moreton and Stradbroke, is 40 miles long by 17 broad; its south half is dotted with islands and sandbanks. It receives the six considerable streams, Nerang, Pimpama, Logan, Pine, Caboolture, and Brisbane, with the important city of Brisbane at its outlet. The entrance at the north end is practicable at all times for vessels of the largest size; the entrance between

Moreton and Stradbroke Islands is narrow and less safe.

Moretto da Brescia, mō-rĕt'tō dä brä'chē-ä, (his proper name was ALESSANDRO BONVICINO), Italian painter: b. Brescia 1498; d. there 1555. He took Titian as his model, imitating also Palma Vecchio and Romanino, whose styles he developed on independent lines of his own. He was already famous as an artist at 18, and reckoned a master of pictorial expression uniting in his coloring tenderness and freshness of flesh tones with a brilliant power of chiaroscuro. His pictures are particularly noted for their bright background, from which his figures stand off with life-like clearness. His numerous religious paintings are full of devotional feeling. Most of these are at his native town of Brescia. In St. Clement's Church in that place is a vast altar piece of his containing a Madonna and Child surrounded by singing angels and the Saints Clement, Dominick, Florian, Catharine, and the Magdalen. He painted an 'Assumption' in the Church of San Mazaro. His masterpiece 'The Virgin Appearing to a Shepherd' is in the church at Paitone, province of Brescia. There are some fine paintings of his in the galleries at Berlin and Frankfort, and in the Brera at Milan; and examples are to be found also in the public galleries of Vienna, St. Petersburg, and Paris. The portraits by this master are equally excellent in conception and power of coloring.

Morey, mō'rĭ, **Samuel,** American inventor: b. Hebron, Conn., 23 Oct. 1762; d. Fairlee, Vt., 17 April 1843. He early evinced a talent for mechanics and engineering and at the time of the opening of the Connecticut River to navigation designed and built the locks at Bellows Falls. On his large estates he built chutes with which to bring his pine logs to the mills years before Napoleon's accomplishment of the feat in the Alps. When but 18 he began his experiments with steam and in 1790 had conceived the idea of propelling boats by means of an improved steam-engine. In 1793 he succeeded in building a boat which attained a speed of four miles an hour and later he improved it and exhibited it in New York with a speed of five miles an hour. Morey was often in consultation with Professor Silliman of Yale College as to the value of his inventions and when Chancellor Robert R. Livingston offered him $7,000 for the patent allowing him to run the boat from North River to Amboy Morey declined. He continued his experiments, encouraged by an offer of $100,000 for an eight-hour steamboat which Livingston was said to have made and several patents were issued to Morey indicating that he considered the object almost within his reach. In 1797 he exhibited a greatly improved boat at Philadelphia and became famous throughout the Middle and New England States. His object seemed practically achieved and arrangements were made for the operation of the steamboats when misfortune overtook the capitalists who were to promote the enterprise and it failed of operation. Morey is believed to have been the real inventor of the steamboat by many authorities, as Robert Fulton visited him before the exhibition of his own invention.

Morey Letter, The, in American political history the forgery of a letter during the Garfield-Hancock campaign of 1880. The letter which favored Chinese immigration purported to have been written by Gen. Garfield and to be addressed to H. L. Morey, Lynn, Mass., and was made public in the New York *Truth*, 20 Oct. 1880. James A. Garfield, Republican candidate for President, denounced the letter as a forgery, but Democrats made liberal use of the document and many votes, it is said, were lost to the Republicans through the publication of the letter.

Morgagni, Giovanni Battista, jō-vän'nē bät-tēs'tä mŏr-gän'yē, Italian anatomist: b. Forli, 25 Feb. 1682; d. Padua 6 Dec. 1771. After taking his degree of M.D. at Bologna, he went to Venice and ultimately to Padua, where in 1712 he became professor of the theory of physics; and in 1715, as successor of Molinetti, was appointed to the principal anatomical chair in the same institution, which he continued to occupy till his death. He was the first to show the importance of anatomy as being the basis of all other medical studies, and is regarded as the founder of pathological anatomy. His most celebrated works are: 'Adversaria Anatomica' (1719), afterward enlarged and published under the title of 'Adversaria Omnia' (6 vols., 1741); and particularly his 'De Sedibus et Causis Morborum per Anatomen Indagatis' (1761; 6 vols., Leipsic, 1827), which has been translated into various European languages.

Mor'gan, Daniel, American soldier: b. Hunterdon County, N. J., 1736; d. Winchester, Va., 6 July 1802. His early life was passed in obscurity and in 1753 he removed to Virginia where in 1755 he served under Braddock as a teamster. He was afterward engaged in Indian warfare and served in Pontiac's war and in Lord Dunmore's war. In 1775 he entered the army of the colonists and commanded a company of riflemen under Washington. He accompanied Arnold at Quebec in 1775 and rendered gallant service there but was captured by the British and not exchanged until nearly a year afterward. He was then given command of a Virginia regiment with the rank of colonel, and in the campaign against Burgoyne took a prominent part, but his services not being recognized by Congress he resigned. In 1780 he returned to the service as brigadier-general under Gates and under General Greene who succeeded Gates. Morgan won a brilliant victory over Tarleton, which was recognized by a gold medal from Congress. His subsequent movements were of serious annoyance to Cornwallis, but in 1781 he resigned from the army owing to ill health. In 1794 he returned to it as major-general and helped to crush the whiskey insurrection and in 1795–9 was a member of Congress. Consult: Graham, 'Life of General Daniel Morgan of the Virginia Line' (1856); McConkey, 'The Hero of Cowpens' 2d ed. (1885).

Morgan, Edwin Dennison, American politician: b. Washington, Mass., 8 Feb. 1811; d. New York 14 Feb. 1883. He was educated in the public schools, at 17 entered the store of his uncle in Hartford, Conn., and three years later was made a partner in the business. In

1836 he removed to New York and engaged in the grocery business. Elected to the State senate in 1850 continued in that office until 1858 when he was elected governor of the State and served until 1862, his administration during those trying times being marked by great sagacity and patriotism and New York's firm attitude during the war may be traced in a large measure to Governor Morgan's influence. In 1862 he was elected to the United States senate but in 1865 declined the secretaryship of the treasury offered him by President Lincoln. He served in the Senate until 1869 and though still taking an active interest in politics held no further political office excepting that of chairman of the Republican committee which conducted the presidential campaign of General Grant in 1872. He was connected with numerous great financial enterprises during the last years of his life and was a generous benefactor of various colleges, etc.

Morgan, Sir **George Osborne,** English politician: b. Gothenburg, Sweden, 8 May 1826; d. 1897. He was graduated at Oxford in 1848, and was admitted to the bar in 1853. In 1868 he became a member of the House of Commons and was a staunch supporter of various reform movements, particularly those concerning the English land laws, religion and education. He was appoined judge-advocate in Gladstone's cabinet in 1880 and in 1886 was under secretary for the Colonies. He was made a baronet in 1892 and was leader of the Welsh party in the House of Commons until his death.

Morgan, George Washbourne, American organist: b. Gloucester, England, 9 April 1822; d. Tacoma, Wash., 10 July 1892. When he was 8 he played the entire service at St. Nicholas' Church in Gloucester and at 12 became assistant organist at the cathedral there. He removed in 1853 to New York, where he was organist in several leading churches, and gave recitals in different cities of the United States with marked success. He conducted an annual Lenten service in Chickering Hall, New York after 1880 and was the author of an Episcopal service, and numerous other compositions.

Morgan, George Washington, American soldier: b. Washington County, Pa., 20 Sept. 1820; d. Fortress Monroe, Va., 27 July 1893. He left college in 1836 to enlist in the Texas army and fought for the independence of that country as lieutenant and then as captain when he resigned and in 1841 entered West Point. In 1843 he left the academy to study law and established a law practice at Mount Vernon, Ohio, in 1845. When the Mexican War broke out he became colonel and served under General Scott with distinction, becoming brigadier-general. He returned to his law practice and in 1856 was sent as United States consul to Marseilles; in 1858 he went from there to Portugal as minister where he remained until 1861. He entered the army immediately upon his return to United States and as brigadier-general was given a command under General Buell. In 1862 he took command of a division of the Army of Ohio and later was with Sherman at Vicksburg. He was compelled to resign in 1863 on account of failing health. He afterward entered political life and was elected to Congress in 1866 and in 1870.

Morgan, Sir **Henry John,** Welsh buccaneer, lieutenant-governor of Jamaica: b. Llanrhynny, Glamorganshire, about 1635; d. Jamaica 1688. While a boy he was kidnapped at Bristol and sold at Barbados. Just when he joined the Jamaica buccaneers is uncertain, as there were several Morgans in the Marine at Jamaica at the time, but he may have commanded his own ship as early as 1663; a Captain Morgan who sailed from Jamaica in that year taking part in the sack of Vildemos, Truxillo, and Granada (1665–6). In 1666 Morgan sailed under Mansfield to capture Curaçao and was chosen admiral after Mansfield's death at the hands of the Spanish. In 1668 he captured Puerto Principe to get information of Spanish plans for an attack on Jamaica; then took Porto Bello, Panama, after a sharp siege during which the buccaneers planted scaling ladders under the cover of captured priests and nuns, sacked the city, and tortured and maltreated its inhabitants; and in the end of the summer again ravaged Cuba. The next year, 1669, saw Morgan's attack on Maracaibo in March, followed by fresh outrages. The arrival of three Spanish warships did not check Morgan's success, for he set fire to one ship, captured another, and forced the Spaniards to beach and burn the third; he killed almost all his prisoners, recovered 15,000 pieces of eight from the sunken ship, got a ransom for the city from the Spanish forces in the fort, and by a clever maneuver made his escape. Returning to Jamaica he was first reproved for exceeding his powers, and then made commander-in-chief of the entire naval force of Jamaica, so that in 1671 with a stronger force under him than before he approached the city of Panama, which he captured after a thrilling battle, in which the Spanish cavalry was broken by riding into a swamp, and further execution was done by a herd of cattle which the Spaniards intended should break the English ranks but which stampeded the Spanish. This attack and capture of Panama was some time later than the signature of peace between England and Spain, so that Morgan was ordered to England for trial in 1672. Nothing serious came of this, however, possibly because Morgan made free use of his wealth in England, and in November 1674 he was commissioned lieutenant-governor of Jamaica, where his after life was uneventful and his administration apparently excellent. He can hardly be called a pirate; his cruel, brutal methods were those of his enemies and England's enemies. The primary source for Morgan's life is Exquemeling, 'Buccaneers of America' (1648), the work of one of Morgan's followers. Professor J. K. Laughton in the 'Dictionary of National Biography,' Vol. XXXIX. (1894), first set straight the chronology of Morgan's life. Popular accounts are Hutcheson, 'Sir Henry Morgan' (1890); Pyle, 'Buccaneers of America' (1891); Stockton, 'Buccaneers and Pirates of Our Coast' (1898); and Brady, 'Sir Henry Morgan,' a romance (1902).

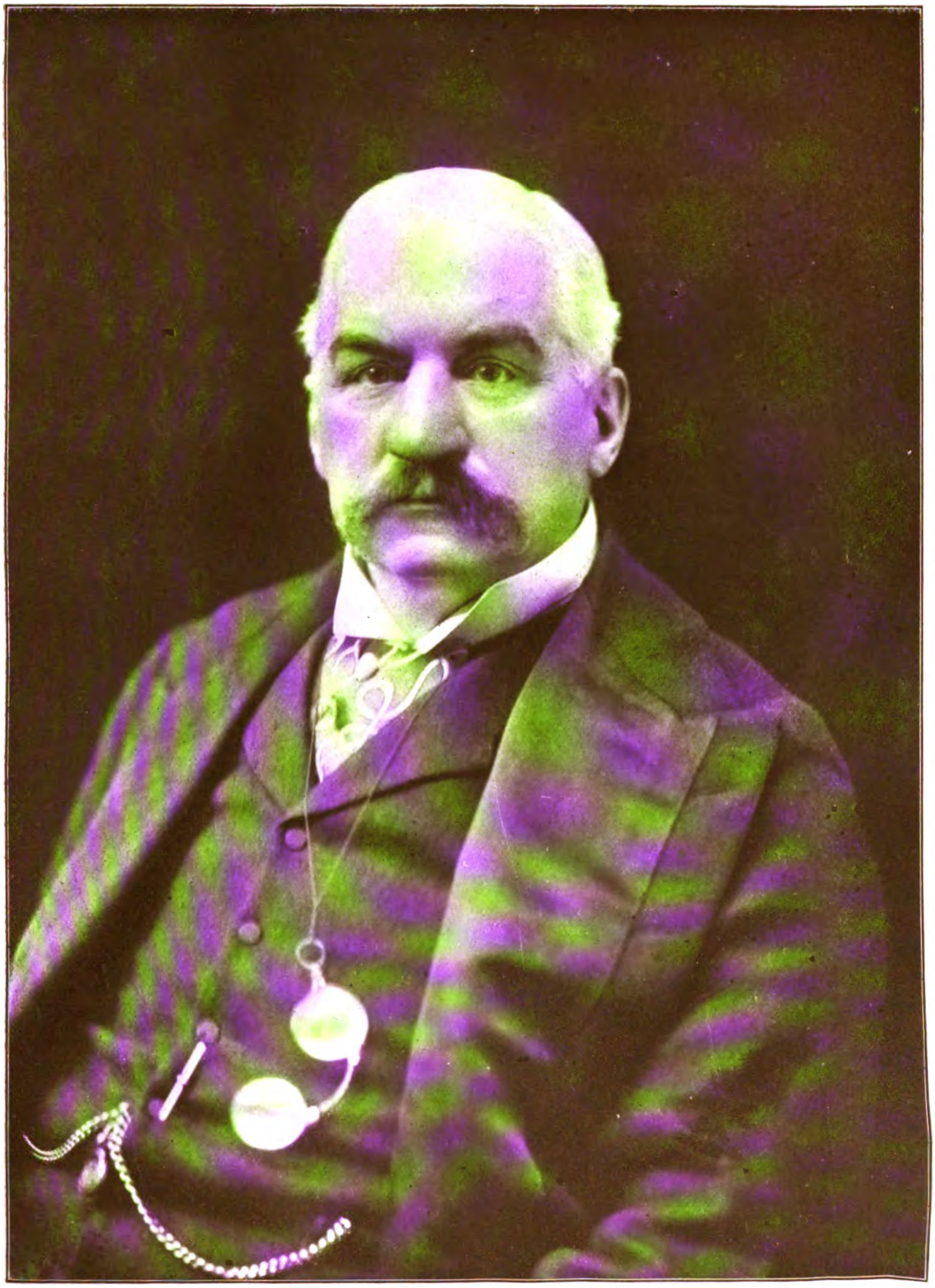
Morgan, James Appleton, American lawyer and author: b. Portland, Maine, 2 Oct. 1850. He was graduated at Racine College, Wisconsin, in 1867, and at the Columbia Law

School in 1869, and in 1871 began the practice of law in New York city, becoming professionally associated with railroad interests. In 1885 he founded the Shakespeare Society of New York, of which from the first he has been president. Its publication, the 'Bankside Edition of Shakespeare' (20 vols., 1888–92), was edited by him. His writings include: 'Macaronic Poetry' (1870); 'The Law of Literature' (1874); 'Legal Maxims' (1877); 'The Shakespearean Myth' (1880); 'Shakespeare in Fact and Criticism' (1884); 'Some Shakespearean Commentators' (1885); 'Digest Shakespeareana' (1887); 'The People and the Railways' (1888); and 'The Society and the Fad' (1890).

Morgan, John Hunt, Confederate general: b. Huntsville, Ala., 1 June 1826; d. New Greenville, Tenn., 4 Sept. 1864. His boyhood was spent in Lexington, Ky., where he was later a manufacturer of bagging. Having served through the Mexican War as lieutenant of cavalry he was eager to enlist for the Civil War and was appointed captain of volunteers. Soon discovering that he could best serve the Confederacy by adopting guerrilla methods of warfare he began the series of raids which so annoyed the Union commander. Moving with great celerity, and accompanied by his own telegraph operator, he kept himself acquainted with the plans of the enemy while he misled them regarding his own position. As the result, bridges which they expected to cross were burned, much-needed supply trains were captured and railroad tracks were destroyed. In 1862 he was rewarded by appointment as major-general. In 1863 he projected an extended raid through Kentucky, Ohio and Indiana, but was captured and, with many companions, imprisoned in the Ohio Penitentiary. Escaping, he again attempted a raid, but, while sleeping at a farm house near Greenville, Tenn., he was surrounded by National troops under Gen. Alvin C. Gillem, and upon attempting to escape, was killed. See MORGAN'S RAID INTO INDIANA AND OHIO.

Morgan, John Pierpont, American financier: b. Hartford, Conn., 17 April 1837. He is the son of J. S. Morgan (q.v.). He was educated at the English High School in Boston, and at the University of Göttingen, Germany. He began his business career in the banking house of Duncan, Sherman & Co., New York city; in 1860 he became agent and attorney in the United States for George Peabody & Co. of London; in 1864 junior member of the banking firm of Dabney, Morgan & Co., and later member of the firm of Drexel, Morgan & Co., of which his father was also a partner. By the death of the older members of the firm he became the head of the latter house, and the firm name was changed to J. P. Morgan & Co. He also controls the firm of J. S. Morgan & Co. of London, and has a partnership interest in Drexel & Co. of Philadelphia. For many years his chief interest lay in railroad negotiations and combinations, and he has gradually gained control of the New York Central system, the New York, New Haven and Hartford, the Reading, the Erie, the Lehigh Valley, the Southern, the Northern Pacific, the Big Four, and the Chesapeake and Ohio. Shortly after this great railroad consolidation was completed (1901), he succeeded in organizing the "United States Steel Company," uniting the Carnegie Steel Works and other large concerns with a capitalization of $1,100,000,000, and dominating the steel industry of the United States. In the same year he bought up a large English shipping line with the evident design of organizing a trust for the control of transatlantic shipping; but has not succeeded in completing the consolidation. He is the head of both the anthracite and the soft coal trusts, and has several times been prominent in the settlement of miners' strikes. In 1895 he organized the syndicate which floated the United States bond issue of $62,000,000, for the increase of the gold reserve; and in 1901 secured American subscriptions of $50,000,000 to the British war loan. Probably no other American capitalist is so well known and so thoroughly trusted in Europe as Mr. Morgan; particularly is this true as regards England, and a large majority of English investments in American securities are made through his house; everywhere he is recognized, not merely as a man of vast wealth, but also as a man of unusual organizing and constructive ability. He has given largely to many charities and institutions, particularly to hospitals, churches, and the Trade School in New York, and to Harvard University. He is an enthusiastic yachtsman, was for two years commodore of the New York Yacht Club, and built the yacht Columbia which defeated Sir Thomas Lipton's Shamrock in the international yacht races.

Morgan, John Tyler, American lawyer and politician: b. Athens, Tenn., 20 June 1824; d. Washington, D. C., 11 June 1907. He went to Alabama when nine years old, received his education there, was admitted to the bar in 1845, and commenced practice. He rapidly gained a high reputation as a lawyer and speaker; was presidential elector in 1860, voting for Breckenridge; and in 1861 was a delegate to the Alabama convention which declared for secession. He enlisted in the Confederate army as a private in 1861; in 1862 raised a regiment in his State, of which he was made colonel; and in 1863 was commissioned brigadier-general and commanded a division under General Johnston. After the war he resumed the practice of law at Selma, Ala., was presidential elector on the Democratic ticket in 1876; and in 1877 was elected to the United States Senate. He was five times re-elected in 1882, 1888, 1894, 1900, and 1907; in 1900 there was no opposing candidate and he received the unanimous vote of the Alabama senate and house. He was long recognized as one of the ablest leaders of the Democrats in the Senate, was a member of the Senate committee on foreign relations, and for some years its chairman; in his last term he was chairman of the committee on interoceanic canals; and favored the Nicaragua canal route instead of the Panama, so that November 1903 he was removed from that post. He was an earnest and able advocate of recognition of Cuban independence and won popularity in all parts of the country by his eloquent speeches in behalf of Cuba. In 1892 he was appointed by President Harrison one of the board of arbitration on the Bering Sea Fisheries; and in 1898 was one of the commission appointed by President McKinley to prepare a system of laws and organize the government for the Hawaiian Islands.



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J. PIERPONT MORGAN.

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JOHN TYLER MORGAN,

LATE U. S. SENATOR FROM ALABAMA.

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Morgan, Junius Spencer, American financier: b. West Springfield (now Holyoke), Mass., 14 April 1813; d. Monte Carlo, Monaco, 8 April 1890. He entered a dry-goods store when a boy and remained there until he came of age when he was engaged for 18 months in banking in New York. He returned to the dry-goods business in Hartford, Conn., where he was junior partner in a leading firm and rapidly advanced until he formed a partnership under the name of J. M. Beebe, Morgan & Co., which became one of the largest dry-goods establishments in the United States. In 1854 he was a member of the banking house of George Peabody & Co., in London, which subsequently became J. S. Morgan and Co., and was ranked among the world's greatest banking houses. He was a generous benefactor of various public and private institutions, among them being Trinity College, Hartford, and the Hartford Orphan Asylum. He established a public library in Hartford, and made valuable donations to the Metropolitan Museum of Art, Yale College, etc.

Morgan, Lewis Henry, American archæologist and anthropologist: b. Aurora, N. Y., 21 Nov. 1818; d. Rochester, N. Y., 17 Dec. 1881. He was graduated at Union College in 1840; practised law at Rochester in 1844–64; and served in the State assembly (1861) and senate (1868–9). His earliest work, 'The League of the Iroquois' (1851), was the first scientific account of the organization and government of an Indian tribe; but even more valuable are his 'Systems of Consanguinity and Affinity of the Human Family' (1869), and his treatise on 'Ancient Society' (1877), each based on the same material, the former being a collection of facts, the latter a philosophical treatise. He also published 'The American Beaver' (1868), and 'Houses and House-life of the American Aborigines' (1881). In 1875 he was elected to the National Academy of Sciences, and 1879 was president of the American Association for the Advancement of Science.

Morgan, Matthew Somerville, American artist: b. London 27 April 1839; d. New York 2 June 1890. He studied scene painting, but soon abandoned it to become correspondent and illustrator for the London 'News,' afterward studying in Paris, Italy, and Spain, and in 1858 penetrated the interior of Africa on a sketching tour. Returning to London he became joint editor and proprietor of the 'Tomahawk' and his cartoons which audaciously attacked the aristocracy and royalty brought him into disfavor. He assisted in the establishment of the London 'Fun' and in 1870 removed to United States where he was engaged with Frank Leslie. He managed several theatres in New York, managed the Strobridge Lithograph Company of Cincinnati in 1878–85 and founded in that city the Matt Morgan Pottery Company and the Art Students' League.

Morgan, Sydney Owenson, LADY, Irish novelist: b. Dublin, Ireland, about 1780; d. London, 14 April 1859. Her father was an actor on the Dublin stage, of the name of Mac Owen, afterward changed to Owenson. Her first literary effort was a volume of poems (1801), followed by a collection of Irish songs, and two novels, 'St. Clair,' and the 'Novice of St. Dominick.' In 1806 appeared her 'Wild Irish Girl,' a novel which became immediately popular, and secured for her a high position in fashionable and literary life. She had by this time removed from Dublin to London, and in 1812 was married to Sir Charles Morgan, an eminent physician. Among other writings by Lady Morgan are the novels 'O'Donnell,'; 'Florence Macarthy,'; and 'The O'Briens and The O'Flahertys'; the 'Life and Times of Salvator Rosa'; 'Woman and her Master'; and 'Passages from my Autobiography.' Consult Fitzpatrick, 'Lady Morgan' (1860).

Morgan, Thomas J., American lawyer and Socialist leader: b. Birmingham, England, 27 Oct. 1847. He worked at the machinist's trade for 37 years, and has been active in the labor movement since 1875; in 1895 he was graduated from the Chicago Law College, and has since practised law. He was one of the committee appointed to secure the location of the World's Fair at Chicago; and also represented the labor organizations before a Congressional committee, requesting that the Fair be open on Sunday. He was for several years a member of the Socialist Labor Party, and in 1891 that party's nominee for mayor of Chicago. At the time of the formation of the Social Democratic Party (later re-organized as the Socialist Party) he was active in the work of organization, and has since been a prominent member of the party, being secretary of their national campaign committee in 1900, candidate for State's attorney in Cook County, Ill., in 1900, delegate to the national convention at Indianapolis in 1901, and candidate for city attorney in Chicago in 1903. He was also one of a committee of 100 selected by the Civic Federation to recommend reforms in Chicago public schools; and presented the Socialists' view of the trust before the Trust Conference held at Chicago.

Morgan, William, American Freemason, whose death was the immediate cause of the formation of the Anti-Masonic party: b. Culpeper County, Va., about 1775; d. possibly near Niagara in 1826. He fought in the defense of New Orleans in 1815; removed to York, Canada, in 1821, where he became a brewer, and whence soon after he moved to Batavia, N. Y.; and in August 1826 disappeared soon after a rumor had been spread that he was to reveal the secrets of the Masonic Order. He was supposed to have been abducted by fellow Masons and drowned in Lake Ontario, but his death was never proved. A corpse found near the mouth of Niagara River was stated to be his; much political capital was made of this «proof»; and Thurlow Weed, a leader in the anti-Masonic movement (see ANTI-MASONS), cynically said that it was «a good enough Morgan till after election,» a remark that has become proverbial of campaign deceit. Morgan's book 'Illustrations of Freemasonry, by One of the Fraternity Who Has Devoted Thirty Years to the Subject' (1826) roused much less excitement than the story of his death. Consult: Greene, 'The Broken Seal' (1870); Morris, 'History of the Morgan Affair' (1852); O'Reilly, 'American Political Anti-Masonry' (1879).

Morgan, Fort. See FORT MORGAN.

Morgan City, La., city, port of entry, in Saint Mary's Parish; on the Atchafalaya

Bayou, and on the Southern Pacific Railroad; about 70 miles west by south of New Orleans, and 20 miles from the Gulf of Mexico. The place was formerly known as Brashear City. The Atchafalaya Bayou is navigable for steamers of light draught, and as it connects Grand Lake and the Gulf, Morgan City has steamer connections inland for some distance and with the principal Gulf ports. Considerable sugarcane is cultivated in the country around Morgan City. The chief industrial interests are connected with the cultivation of sugarcane, rice, and with market gardening, fish, and oysters. It has Oneonta Park in which are botanical gardens and a fine zoological collection. On 23 June 1863 a Confederate force of 3,000 soldiers under Richard Taylor captured the Federal garrison of about 1,000 soldiers. The Confederates secured property to amount to $2,000,000; but they soon abandoned the city, and the Federals again took possession. Pop. (1890) 2,291; (1900) 2,332; (1910) 5,477.

Morganatic Marriage, a marriage between a prince or noble and a woman of inferior rank in cases where a perfect marriage is not legal except with a woman of equal rank. The distinctive feature of the morganatic marriage is that the wife does not acquire the rank of the husband, and the children do not inherit it. A morganatic marriage and a regular marriage cannot exist at the same time, so that the Church regards the morganatic marriage as a perfect one. The custom originated in ancient German law, and is most common among the princely families of Germany. In some states the wife and children have no right of succession to the rank and estate of the husband, the children taking the rank of the mother.

Mor'ganfield, Ky., city, county-seat of Union County; on the Illinois Central Railroad; about 30 miles southwest of Evansville, Ind. It is in an agricultural region, in which tobacco is an important product. The principal industrial establishments are tobacco factories, flour mills, carriage factories, brick yards, and lumber mills. It is the seat of Saint Vincent's Academy (R. C.). The city owns and operates the waterworks. Pop. (1890) 1,094; (1900) 2,046; (1910) 2,000.

Morgan's Raid into Indiana and Ohio. In the middle of June 1863 Gen. Bragg ordered Gen. John H. Morgan, with 2,000 picked mounted infantry and four guns, to move from Tennessee into Kentucky, break up the railroad upon which Gen. Rosecrans depended for supplies, capture Louisville, destroy the public works, and return to Tennessee as quickly as possible. Morgan determined to exceed his orders and make a raid north of the Ohio. On 2 July, with 2,460 men and four guns, he set out from Burkesville, crossed the Kentucky River in the face of Union troops guarding it, and marched northward, followed by all the Union detachments within immediate call. He passed through Columbia, after a sharp skirmish with about 300 of Wolford's Kentucky cavalry, in which he lost about 40 in killed and wounded, and on the 4th reached Green River at Tebb's Bend, and demanded the surrender of Col. O. H. Moore, who, with about 300 men of the 25th Michigan, was guarding the bridge at that point. Moore replied that the Fourth of July was not a good day to surrender, and was instantly attacked with artillery and musketry. After a hard fight of three hours, in which Moore had 6 killed and 23 wounded, Morgan was repulsed, with a loss of 36 killed and 46 wounded, and drew off, crossing the river below the bridge. On the 5th he defeated and captured the small garrison of Lebanon and marched by Bardstown to Brandenburg, on the Ohio, where he arrived on the morning of the 8th, and seizing two steamboats began crossing his command. His passage was disputed by a gunboat and by militia with a field-piece on the Indiana shore, but by the morning of the 9th his whole command was in Indiana. Twenty-four hours later Gen. Hobson, with 2,500 cavalry and mounted infantry and four guns, crossed the river in pursuit, and for 17 days hung upon Morgan's heels. Indiana and Ohio were aroused and turned out their militia by thousands. After crossing the Ohio Morgan rode north through Corydon, where he was resisted by militia, who were soon overpowered. He then pushed on to Salem, where he captured nearly 400 militia, then through Lexington and Paris to Vernon, near which place on the evening of the 11th he encountered a stiff resistance from about 1,200 militia under Col. Love. Under cover of darkness he withdrew from Love's front, and pressing on through Dupont and Sunmansville, crossed the Indiana line on the 13th to Harrison, Ohio, and concentrated his command preparatory to making his way across the Ohio into Kentucky, detaching parties to burn bridges and confuse the pursuit, and impressing fresh horses. Under cover of a feint on Hamilton he marched by night a few miles north of Cincinnati, moving directly east, closely pursued next day by Hobson, who was marching 40 miles a day, and threatened from all directions by the militia. Turning toward Berlin, where the government had a large number of animals, he was confronted by a small body of militia, under Col. Runkle, lost much precious time in threatening an attack, drew off, closely followed by Runkle, and after dark of the 18th reached the banks of the Ohio, a short distance above Pomeroy, near Buffington Bar and Blennerhasset's Island, where from the first he had planned to escape. His pursuers were closing in on him from every direction. On the west Hobson was hanging on his rear; Gen. Judah, who had been withdrawn from Kentucky, had landed his division at Portsmouth, and was marching up from the southwest; regiments were coming down the river from Parkersburg; and gunboats patroled the river and watched the fords. Early in the morning of the 19th Morgan endeavored to cross the river, but was speedily checked. He was attacked in rear by the head of Hobson's column, Judah's cavalry struck him in flank, and two gunboats opened upon his front. A severe engagement cost him about 120 killed and wounded, and more than 700 of his officers and men surrendered, Morgan with the remainder escaping up the river, where he attempted to cross to Belleville by swimming his horses. Three hundred men, under Col. Johnson, had crossed when a gunboat stopped the remainder of the column, Morgan himself returning to the Ohio shore and with about 800 men retreating inland. He had lost all his artillery and trains. He pressed on northeast through Athens and Washington, marching 35 miles a day, burning bridges behind him, with Gen. Shackelford and 500 men close upon his rear and skirmishing with it. Near Salineville on the 26th Shackelford's advance captured 250 men, and later in the day he was intercepted near New Lisbon and Beaver Creek, and surrendered with 364 officers and men. The Union loss in the campaign July 2–26 was 19 killed, 47 wounded, and 8 missing. Consult: 'Official Records, Vol. XXIII.; Duke, 'History of Morgan's Cavalry'; Senour, 'Morgan and His Captors'; The Century Company's 'Battles and Leaders of the Civil War,' Vols. III. and IV.

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Mor'gantown, N. C., town, county-seat of Burke County; on the Southern Railroad; about 80 miles west of Salisbury. In the vicinity are gold deposits. It has lumber and cotton mills, flour mills, machine-shops, and tanneries. It is the seat of the North Carolina School for the Deaf and Dumb and of the State Hospital for the Insane. It is a favorite health resort for people threatened with pulmonary diseases. Pop. (1890) 1,557; (1900) 1,938; (1910) 2,712.

Morgantown, W. Va., city, county-seat of Monongalia County; on the Monongahela River, and on the Baltimore & Ohio and Morgantown & Kingwood R.R.'s; 100 miles south of Pittsburg, near the northern boundary of the State, eight miles south of Mason & Dixon's line; lat. 39° 38' N.; lon. 2° 39' W. of Washington.

The first settlement was made in 1766 by Nicholas Decker; soon followed by the Morgan family, from whom it takes its name. It was incorporated in 1838 and chartered as a city in 1901. It is in a region noted for its extensive coal fields, and good water-power, which is used for manufacturing. In the vicinity are large forests, oil fields, glass-sand deposits, and limestone. The chief industrial establishments are, factories (1903), window glass, which employ 500 persons; tumbler glass, 700 employees; wire glass, 200; pressed prism glass, 100; a mirror factory, 75; foundry works, 20; publishing company, 30; utility works, 100; brick works, 40; and other small manufactories. There is considerable trade in coal, coke, oil, live-stock, manufactured articles, and agricultural products. The five banks have a combined capital of $510,000, and deposits amounting to $1,500,000. It is the seat of the State University, which in 1903 had 800 students, and of the Military and Agricultural Colleges in connection with the State University. There are good public schools, secondary and elementary, 1,100 pupils in attendance. There are a number of good church buildings, the finest is the Methodist Episcopal, a stone building which cost $100,000.

The government is vested in a mayor, recorder, council of 11 members (the mayor and recorder are included in the council), elected by the people of the four wards. The population includes the following nationalities: American, white, 8,000, colored, 200; German, 400; French, 125; Belgian, 75; Italian, Slav, and others, 250. Pop. (1890) 1,011; (1900) 1,895; (1910) 9,150.

J. FRANK NELSON,
Editor 'Morgantown News.'

Morgarten, mōr-gär'tĕn, Switzerland, a hill two miles west of Rothenthurm, on the margin of the lake of Egeri, on the confines of the canton of Zug, memorable as the scene of the battle of 15 Nov. 1315, in which a small body of Swiss mountaineers from Schwytz, Uri, and Unterwalden, ill armed and undisciplined, totally vanquished an Austrian army of 20,000 under the archduke Leopold, sent by Frederick the Fair to avenge the seizure of the Abbey of Einsiedeln the previous year. This was the first victory achieved by the Swiss in their struggle for freedom. A chapel stands at the foot of the hill, in which service is performed annually on the anniversary of the battle.

Morghen, Raffaello, răf-fā-ĕl'lō mŏr'gĕn, Italian engraver: b. Florence 19 June 1758; d. there 8 April 1833. He received his early instruction in his art from his father Filippo and his uncle Giovanni Elia, and was afterward placed as a pupil under the celebrated Volpato, whom he assisted in engraving the pictures of Raphael in the Vatican. The print which represents the miracle of Bolsena is inscribed with his name. He settled in Florence about 1793 as professor of copper-plate engraving in the academy of art. Here the grand-duke employed him to engrave Leonardo da Vinci's 'Last Supper,' which is painted on the wall of the refectory in the Dominican convent at Milan. This picture is faded and effaced, and the drawing which was made from it for Morghen was by no means worthy of the original; so that, though the engraver has given to the world an admirable print, he has failed in giving a correct idea of the work of Leonardo. In 1803 he was chosen an associate of the French Institute; and in 1812 was invited to Paris by Napoleon, who treated him with flattering kindness. Among the most remarkable of the other numerous works of Morghen may be noticed the 'Transfiguration' from Raphael; a 'Magdalen' from Murillo; a 'Head of the Savior' from Da Vinci; the 'Car of Aurora' from Guido; the 'Hours' from Poussin; the 'Prize of Diana' from Domenichino; the 'Monument of Clement XIII.' from Canova; 'Theseus vanquishing the Minotaur'; portraits of Dante, Petrarch, Ariosto, Tasso, etc.

Morgiana, môr-gĭ-ā'nạ, a female slave figuring in "Ali Baba and the Forty Thieves," a story in the 'Arabian Nights Entertainment' (q.v.).

Morgue, môrg, a place or building in large cities where the bodies of unknown persons who have perished by accident, murder, or suicide are exposed, that they may be recognized by their friends. If not claimed after remaining three days they are buried.

Mori Arinori, mō'rē ā-rē-nō'rē, Japanese statesman: b. Satsuma 1848; d. 11 Feb. 1889. He was educated in England; as *chargé d'affaires* in Washington arranged the postal convention between Japan and the United States; served as plenipotentiary in Peking and in London; and was minister of education from 1885 to his death. He was an extremely cultured man, with progressive educational ideas. On the day of the proclamation of the Japanese constitution he was assassinated by a Shinto fanatic for violating a shrine at Ise by lifting the curtain with his walking stick.

Moriah, mō-rī'a, Palestine, the hill on which the temple of Jerusalem was built (2 Chron. iii. 1), and by many authorities believed to be the mount on which Abraham was commanded to sacrifice his son Isaac (Gen. xxii. 2).

Morichi, a palm. See MURICHI.

Morillo, mō-rēl'yō, **Pablo,** Spanish general: b. Fuente de Malva, Spain, 1777; d. Madrid, Spain, 27 July 1838. He enlisted in the navy in 1797 and was engaged at Trafalgar in 1805, but when the French invaded Spain left the navy to enter the army and rose to the rank of major-general in 1814. In 1815 he was sent to South America to subdue the revolution in Venezuela and Colombia and after varying fortunes, during which he made for himself a name as a cruel and tyrannous general, perceiving defeat to be inevitable, he asked to be relieved but was compelled to sign a truce with the victorious Bolivar before sailing for Spain. He was appointed to command the garrison at Madrid and in 1822 became captain-general of Galicia which he surrendered to the French. He retired in disgrace to Rochefort, France, but returned to Spain in 1832. During his exile in France he published his 'Mémoires' (1826).

Morin, Arthur Jules, är-tür zhül mō-răṅ, French mathematician and engineer: b. Paris 19 Oct. 1795; d. there 7 Dec. 1880. He was educated at the Ecole Polytechnique in Paris and at the Ecole d'Application at Metz, and was for a time professor of mechanics in the latter institution. In 1819 he became lieutenant in a battalion of engineers and later accepted a professorship at the Conservatoire des Arts et Métiers in Paris of which he became director in 1847. He held the rank of general in the army and was a member of various military boards, and his researches and inventions were of great scientific value. He published: 'Aide-Mémoire de Mécanique pratique' (1838); 'Salubrité des Habitations' (1874); etc.

Morioka, mō-rē-ō'kā, Japan, a town in the island of Hondo, 40 miles from the coast, and connected by rail with Tokyo. It is the capital of the Prefecture of Iwate, in the northerly province of Rikuchin, has manufactures of silk, copper and other ware, and a trade in fruit, vegetables, etc.

Mor'ison, George Shattuck, American civil engineer: b. Bedford, Mass., 19 Dec. 1842; d. New York 1 July 1903. He was graduated from Harvard in 1863 and was admitted to the bar of New York in 1865. In 1867-73 he was engaged in engineering in Kansas, Michigan, and Indiana, and then returned to New York which he thereafter made his headquarters. He was an expert on railroad conditions and made himself famous as a bridge builder; constructing five bridges across the Missouri and ten over the Mississippi, the greatest of these being the bridge at Memphis, Tenn., which has a single truss span of 790 feet and is surpassed by only two bridges in the world. He was a valuable member of the Isthmian Canal commission appointed by President McKinley in 1898.

Morison, James Augustus Cotter, English biographer and essayist: b. London 1832; d. 26 Feb. 1888. He was educated at Oxford, was a Positivist in philosophy, and one of the founders of the 'Fortnightly Review.' He wrote 'Life and Times of St. Bernard' (3d ed. 1877); lives of Gibbon, Macaulay, and Madame de Maintenon; 'The Service of Man: An Essay toward the Religion of the Future' (2d ed. 1887); etc.

Morison, Robert, Scottish botanist: b. Aberdeen, Scotland, 1620; d. London 10 Nov. 1683. He was graduated from the University of Aberdeen in 1638 but having borne arms as a royalist in the civil war, was obliged to take refuge in France when the cause of Parliament triumphed, and took the degree of doctor at Angers in 1648. From 1650 to 1660 he was superintendent of the garden formed at Blois by Gaston, duke of Orleans. After the Restoration he was appointed by Charles II. one of his physicians and botanist royal, and in 1669 became professor of botany at Oxford. His strong point as a botanist was in classification. His chief work is 'Oxford Universal History of Plants' (1680). Consult: Pulteney, 'Sketches of the Progress of Botany' (1790); Tournefort, 'Eléments de Botanique' (1797).

Morland, môr'land, **George,** English painter: b. London 26 June 1763; d. there 29 Oct. 1804. His father, himself a painter, gave the boy a severe early training in art, and his proficiency was such that his productions found ready purchasers, while at 16 he exhibited in the Royal Academy and became famous as a copyist of Dutch interiors. Soon after he rebelled against the strict discipline of his father's house, and entered upon a career of dissipation, supporting himself, meanwhile, by the pictures which he painted with amazing facility. In 1786 he took up his residence at Kensal Green, where he changed his mode of life and married the sister of James Ward, the animal painter, and William Ward, the engraver. Here he worked hard, and the moral subjects, after the manner of Hogarth, which he favored at this period, were engraved, and became very popular. Soon again, however, he drifted back into his old habits, and, as his pictures were eagerly sought by the dealers, he was able for some time to carry on his reckless career. At length, in 1799, he was arrested for debt, but "obtained the rules of the Bench," took a house within the bounds, and continued to practise his art up to his release in 1802. The art of Morland is characterized by a picturesque representation of rural life in its homelier aspects, his rustic story being always happily conceived and skilfully told. He is one of the first genre and animal painters of the English school. Six of his best paintings are in the Kensington Museum, and the 'Farmhouse Stable' in the National Gallery is sometimes considered his masterpiece. The New York Historical Society possesses his 'Old English Sportsman' and 'Dogs Fighting' and the Metropolitan Museum the 'Midday Meal' and 'Weary Wayfarers.' Consult Dawe, 'Life of Morland' (1807).

Morland, SIR **Samuel,** English inventor and diplomat: b. Sulhampstead-Banister, Berks, 1625; d. Hammersmith 30 Dec. 1695. He studied at Winchester School and at Magdalen College, Cambridge; was a tutor at Cambridge in Pepys' day; and about 1650 devoted himself to diplomacy. Cromwell sent him to Sweden in

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1653; and in 1655 to the Duke of Savoy, to protest against the persecution of the Waldensians, in whose history he became deeply but none too intelligently interested, his 'History of the Evangelical Churches of the Valley of Piedmont' (1658) being full of exaggeration and misinformation. He was close in the secrets of Cromwell, and upon learning of Sir Richard Willis' plot against Charles revealed it to that prince; and was rewarded after the Restoration with a baronetcy. He then withdrew from public life, devoted himself to mechanical experiments, improved the fire pump or fire engine, the lineal predecessor of the steam engine, and invented a speaking trumpet and other nautical instruments. He wrote on cryptography, mathematics, and mechanics.

Morley, mŏr'lĭ, **Edward Williams**, American chemist: b. Newark, N. J., 1838. He was graduated from Williams College, Williamstown, Mass., in 1860. He was elected to the chair of chemistry in Western Reserve College, Hudson, Ohio (later Adelbert College, Cleveland), in 1869 and has retained the office. He was also professor of chemistry at Cleveland Medical College in 1873–88 and he has been connected with various scientific societies. He is the inventor of an improved apparatus for gas analysis and has published: 'Atomic Weight of Oxygen' (1895).

Morley, Henry, English author: b. Hatton Garden, London, 15 Sept. 1822; d. Carisbrooke, Isle of Wight, 14 May 1894. Educated at King's College (London), he practised medicine in Somerset and Shropshire; taught at Manchester; was editorially connected with Dickens' periodicals, 'Household Words' and 'All the Year Round'; was for a time editor-in-chief of the *Examiner;* and in 1865 was appointed professor of literature in University College, London. In 1878 he received a similar chair at Queen's College, London; and in 1882–90 was principal of University Hall, London. As a popular lecturer on literature he was much in demand. He edited 'Morley's Universal Library' (1883–8); 'Cassell's National Library' (1886–90); and the 'Carisbrooke Library' (1889–91); published biographies of Palissy (1852), Jerome Cardan (1854) and 'Cornelius Agrippa' (1856); and wrote 'English Writers' (1887 et seq.), and a smaller work on the same subject, 'First Sketch of English Literature' (1873), a much-used manual.

Morley, John, English writer and statesman: b. Blackburn, Lancashire, 24 Dec. 1838. He studied at Cheltenham College and at Oxford in Lincoln College; was called to the bar in 1859; wrote for the 'Saturday Review'; edited the 'Literary Review' (later the 'Parthenon'); was editor of the 'Fortnightly Review' (1867–82); of the *Pall Mall Gazette* (1880–3), and of 'Macmillan's Magazine' (1883–5). He contested Blackburn unsuccessfully in 1869 and Westminster in 1880, but at a by-election in 1883 was chosen to the House of Commons largely because of his Irish policy (which favored a colonial type of government for Ireland), and was re-elected in 1886, in 1892 (in spite of the powerful opposition of a Labor candidate backed by Keir Hardie), in 1896 (having been defeated in 1895), and in 1901. He was chief-secretary for Ireland in Gladstone's brief ministry of 1886, and in the Gladstone-Rosebery cabinet of 1892–5. In 1905 he became Secretary of State for India in the Liberal cabinet of Campbell-Bannerman. Since 1894 Morley has been a trustee of the British Museum. He did much for the reunion of the Liberal party in 1887, being one of the famous Committee of Five. An able parliamentarian, he is better known as editor, biographer, essayist, and has written: 'Edmund Burke' (1867); 'Critical Miscellanies,' two series (1871–7); 'Voltaire' (1871); 'Rousseau' (1873); 'The Struggle for National Education' (1873); 'Diderot and the Encyclopædists' (1878); 'Burke' (1879); 'Richard Cobden' (1881); 'Studies in Literature' (1891); 'Oliver Cromwell' (1900); and the able and authoritative 'Life of W. E. Gladstone' (1903).

Morley, Margaret Warner, American educator and author: b. Montrose, Iowa, 17 Feb. 1858. She was graduated from the Normal College of New York in 1878 and has since taught in the Oswego Normal School, N. Y., and in the normal school at Milwaukee, Wis. She was for a time engaged in Armour Institute as teacher of biology and has lectured in Boston. She has published: 'A Song of Life' (1891); 'The Bee People' (1899); 'Wasps and Their Ways' (1901); 'The Insect Talk' (1903); and other works intended to familiarize young people with science.

Morley, Samuel, English philanthropist: b. Homerton, England, 15 Oct. 1809; d. near Tunbridge, Kent, England, 5 Sept. 1886. He engaged in mercantile business and amassed a large fortune, which he used in philanthropic enterprises. He represented Bristol in Parliament in 1868–85 and upon his retirement was offered a peerage which he declined. In Parliament he supported various religious and social reforms and was opposed to capital punishment. He was a generous contributor to different public benefactions and labored earnestly to improve the moral and social conditions of the poorer classes, in behalf of whom he spent large sums.

Morley, Thomas, English composer: b. 1557; d. London about 1604. He may have been trained as a choir boy in St. Paul's; was a pupil of Byrd; studied music at Oxford; from 1591 to 1592 was organist of St. Paul's; and in 1592 was appointed gentleman of the Chapel Royal. He is best known by his 'Booke of Aires' (1600), which contains the page's song in Shakespeare's 'As You Like It' with the original music. Morley's 'Plaine and Easie Introduction to Practicall Musicke' (1597), in dialogue form, is the earliest regular treatise on music published in England.

Mormon Crickets, western names for two species of migratory grasshoppers (*Anabrus simplex*, and *A. purpurascens*), which are especially destructive at times in Montana and Idaho. See GRASSHOPPER.

Mormons, or **The Church of Latter-Day Saints**, an American religious sect founded by Joseph Smith, Jr., at Fayette, Seneca County, N. Y., in 1830. In 1823, alleging that he was led by the inspiration of an angel who had appeared to him, he said that he discovered golden plates on which the records of Mormon were inscribed. These, though found in 1823, he was not allowed by the angel to take up till 1827. They were inscribed with characters which were said to be reformed Egyptian, but which he was unable to read There was, however, in the box where they were found, so he declared, a marvelous instrument called Urim and Thummim, by which he was enabled to read the mysterious letters and translate them into English. In 1830 Smith published an English translation of the plates under the title 'The Book of Mormon,' together with certificates of 11 men who claimed to have seen the plates. This book tells how at the time of King Zedekiah of Jerusalem, a pious Israelite by the name of Lehi, together with his family, migrated from Palestine to America and described on these plates the account of his marvelous adventures as well as the revelations which God vouchsafed to him. Many of his sons, like Laman, went out into the wilderness and became the ancestors and chiefs of the North American Indians. The descendants of his son Nephi became good Christians, many centuries before Christ, and among them were preserved the dignity of the priesthood and their sacred plates. To the descendants of this family also appeared the Christ when He rose from the dead, and He chose from the family 12 apostles, who within a brief time converted the whole country to Christianity; but when at the beginning of the 4th century the Church, in consequence of wars, became disintegrated, Mormon, a mighty hero and pious Christian, rose and drove out the Lamanites who had in the meantime become red and fallen into barbarism. Nevertheless they returned about the year 400 and the Nephites perished before them. Mormon's son, Moroni, finished the history of his people in 420. The book was published in 1830, and it was at one time claimed that it was a plagiarism on a novel written by a clergyman named Solomon Spaulding several years before; but this manuscript has been discovered and compared with that of the Book of Mormon, and it is found that they are entirely different. Spaulding's manuscript is now in the Oberlin College, Ohio.

The new prophet immediately began to collect followers about him, and by 6 April 1830 he had organized a church at Fayette, N. Y. The next year the sect numbered several hundred members and moved to Kirtland, Ohio, where they increased in numbers and wealth through the efforts of missionaries who were sent out by the prophet. In 1831 they began to locate in Jackson County, Mo., but in 1833 they were driven out of the county, partly on account of their faith and partly on the charge of being abolitionists. They then took refuge in Clay County and the surrounding regions. In 1838 Governor Boggs of Missouri issued an exterminating order against the Latter-Day Saints and they were driven out of that State. They went to Illinois, where by 1840, on the site of a previous settlement called Commerce, Hancock County, they had founded the city of Nauvoo, over which Smith had extraordinary civil and military authority. The city flourished, soon numbering more than 2,100 houses and having a beautiful temple built according to plans which Smith claimed he had received in a vision. In 1844 a discontented member of the Church issued a newspaper at Nauvoo assailing the prophet and threatening to expose various alleged immoralities and misdeeds. The city council of Nauvoo passed an ordinance declaring the printing-office a nuisance. It was destroyed by the officers of the law. Smith was blamed for this and a warrant was issued for his arrest. Before civil war actually broke out, the governor of the State induced Smith to surrender and go to Carthage. On 27 June 1844, a mob attacked the jail, overpowered the guard, killed Smith and his brother Hyrum and wounded others of the prophet's party.

This did not put an end to Mormonism. Smith was succeeded by Brigham Young (see YOUNG, BRIGHAM), who early in 1846 left Nauvoo with others for the West. In the spring of 1847 a company of 143 started through the wilderness, and on 24 July arrived at the valley of Salt Lake, which he declared was the promised land. It looked far from being the promised land when they got there. Irrigation was absolutely necessary. The first crop they planted was small and the second nearly destroyed by crickets, but they pushed out into the valley, extending their agricultural operations, and made the wilderness blossom like the rose. They made Salt Lake their place of settlement and Young returned to Council Bluffs, where they had set up temporary headquarters, to bring the rest of the saints to Utah. Their new city became an important place on account of its position on the route of wagon trains to and from California, and owing to the wonderful discipline and management of the Mormons and to their system of irrigation, the wilderness, the soil of which was very fertile and needed only cultivation and water, began to prove most productive, and the city to flourish. Brigham Young, on account of his great influence, was appointed governor of the Territory, and Congress granted him $20,000 for the erection of public buildings and $5,000 for a library. In 1854 the government appointed Col. Steptoe as governor. But the Colonel declined the appointment, and Young was reappointed and continued to hold office until 1857, when A. Cumming was appointed in Young's place and was sent with 2,500 men to Utah. The expedition met with difficulties on account of the late season of the year and opposition on the part of the Mormons to having an army sent against them in time of peace, as they claimed that they had committed no hostile act against the United States government. A peace commission was sent to Utah in 1858, and the people who had already commenced to move away from their homes (which they had prepared to burn on the entrance of the army) were induced to return. Young, although deposed from his position as governor of territory by the appointment of Cumming, continued to possess great influence in the commonwealth. Many missionaries were sent out and the number of Mormons increased with great rapidity. Young died in 1877 and 1880 John Taylor was elected president. He had been with Joseph Smith in Nauvoo and was shot and wounded when Smith was killed. He died in 1887, and in the same year was succeeded by Wilford Woodruff, who was 80 years old; a most remarkable man, who preserved his faculties without impairment even beyond the age of 90. In 1890 he issued his famous manifesto forbidding polygamy. In 1896 Utah became a State and in the following year the 50th anniversary of the entering of the saints into that region, was celebrated. In 1898 President Woodruff died, and Apostle Lorenzo Snow succeeded to the presidency of the Church. He also was a very old man, more than 85 years old, a friend of Joseph Smith, and an apostle since 1849. President Snow died 10 Oct. 1901, and was succeeded by Joseph Fielding Smith, a nephew of Joseph the founder.

The membership of the Mormon Church is about 400,000 and there are flourishing communities in other countries besides the United States. Mormons express their belief in the Trinity, that men will be punished for their sins, that through the atonement of Christ mankind may be saved by faith, in repentance, in baptism, in the laying on of hands for the gift of the Holy Ghost. They believe in a church organization comprising apostles, prophets, pastors, teachers and evangelists, in the apostolic gifts of tongues, prophecy, visions, in the power of healing, in the Bible as the word of God, and in the book of Mormon as the further word of God. They believe in the literal gathering of Israel and the restoration of the 10 tribes, who will build Zion on the American continent, and that Christ will come himself to reign. Supreme authority is vested in the president, who is designated as "prophet, seer and revelator," and in two counsellors chosen by the body of the Church. There are 12 apostles and a hierarchy consisting of the patriarchs, seventies, high priests, elders, bishops, priests, teachers and deacons, the whole forming a pure theocracy. They believe in continuous divine revelation, but that the only authoritative communications from the Lord for the Church come through the prophet president. One of the characteristics of the Mormons has been a plurality of wives, which was regarded as a means of grace, the number of a man's wives and children increasing the man's chances of honor and glory in the world to come. They hold this doctrine to be wholly Biblical. It is maintained that the revelation sanctioning polygamy was received by the prophet as early as 1831, but was withheld from the body of the Church in general and from the world till after they had been settled in Utah. After 1852 polygamy was preached and practised openly, and the leading men generally were polygamists. In 1862 the Federal government enacted a law against the practice, but little attention was paid to it, and not till 20 years later were severer statutes passed against it. In 1884 the constitutionality of the law was established by the Supreme Court of the United States and more than 1,000 men were convicted and sent to the penitentiary, while many of the leading polygamists fled or went into hiding. In 1887 the Mormon Church was disincorporated by Congress, and its immense property was confiscated with the exception of $50,000. Finally in September 1890, after the vast property holdings of the Church had been lost, President Woodruff issued his famous proclamation against polygamous marriages. In 1898 Brigham Henry Roberts was nominated for Congress by the Democratic party of the State, but owing to a charge made against him that he was still living in polygamous relations, his case was submitted to a special committee which recommended that he be not allowed to take his seat in Congress. Salt Lake City, which is still the principal city of Mormons, is remarkable for its tabernacle, a building completed in 1867, 250 feet long, 150 feet wide, 80 feet high, without any supporting pillars, with a total seating capacity of 7,000. Its great organ and choral services, which are given there regularly by a choir of 600 voices, are among the most remarkable features of the Mormon service. Another wonderful building in Salt Lake City is the Temple, which was begun in 1853 and dedicated in 1893. See also Latter Day Saints, The Reorganized Church of.

Revised by Joseph F. Smith,
Of the Presidency of the Church of Latter-Day Saints.

Mormy'rus, a fish of the Nile (*Mormyrus Petersi*), regarded as excellent for the table, and caught with line and hook. Its lower jaw is extended into a fleshy appendage, and its characteristic form is depicted on ancient Egyptian wall-paintings and carvings. It represents a group of malæopterous nocturnal North African river-fishes allied to the pikes.

Mornay, Philippe de, fē-lēp dė môr-nā, Seigneur du Plessis-Marly, French statesman: b. Buhy, Normandy, 5 Nov. 1549; d. La Forêt-sur-Sevre 11 Nov. 1623. He was brought up a Huguenot, entered Coligny's service; escaped to England at the time of the Massacre of St. Bartholomew; returned to France in 1573; and in 1576 joined the army of Henry of Navarre, who used not only his sword but his pen and his diplomatic gifts, made him a member of his council, and appointed him governor of Saumur. After Henry became Henry IV. of France and a Catholic, Mornay was the sole Huguenot leader and was even styled the "Huguenot pope" by his enemies. He retired to Saumur soon after the Edict of Nantes. Mornay wrote, among other controversial works aimed now at pagans or atheists, now at the Roman Catholic Church, 'De l'Eucharistie,' urging the Calvinistic view of the Lord's Supper as opposed to transubstantiation (1598). His 'Mémoires pour servir à l'Histoire de la Réformation en France,' re-edited in 1824, is a valuable source for the history of the period. His wife's memoirs (1824) detail his life down to 1606. Consult also Ambert, 'Duplessis-Mornay' (1847).

Morning-glory, an annual twining or trailing vine (*Ipomœa purpurea*) or some related species, popular as a garden ornament all over the world, and often found escaped to the fields and roadsides. The vine is sometimes 10 feet tall, with large roundish heart-shaped leaves and large delicate ephemeral flowers of very various forms and colors. The seed may be sown in any garden soil well exposed to the sun, where the plants may be expected to grow the following year. They self-sow readily. If the soil is very rich they increase so fast as to make an excellent screen for a low porch by midsummer. See Convolvulaceæ; Ipomæa.

Morn'ingside College, in Sioux City, Ia.; coeducational; founded in 1890 under the auspices of the Methodist Episcopal Church. In 1910 the school had 36 professors and instructors, and about 629 students. There were 4,000 volumes in the library; the grounds, building, and apparatus were valued at $157,000;

the income was $33,000, not including benefactions. The collegiate courses lead to the degress of A.B., B.S., and Ph.B.

Morny, Charles Auguste Louis Joseph, shärl ō-güst loo-ē zhō-zĕf môr-nĕ, Duc de, French politician: b. Paris 23 Oct. 1811; d. there 10 March 1865. He was said to have been a half-brother of Louis Napoleon, being a natural son of Queen Hortense and Count Flahault. He was for a time in the army, then tried commercial speculation, and finally politics. He took a prominent part on the side of Napoleon III. in the *coup d'état* of 1851, and was a conspicuous figure under the Second Empire, during which he was minister of the interior (1851–2), president of the Corps Législatif (1854–65), and ambassador to St. Petersburg (1856–7). Possessed of a certain sort of ability, he employed it with perfect unscrupulousness for the advancement of his personal interest.

Morocco, mō-rŏk'ō, or **Marocco,** a sultanate or empire of northwest Africa, known to its inhabitants only by its Arabic name Moghreb-el-Aksa, «The Extreme West.» It is bounded on the west by the Atlantic Ocean, north by the Mediterranean Sea, northeast by Algeria, and east and south by the Sahara, the boundary in the southwest being formed by the Wady Draa, while elsewhere there is no definite line of demarcation between the French Sahara and Morocco; area, about 300,000 square miles. The rulers of Morocco exercised sovereignty at one time over Twat, or Touat, and several other oases in the heart of the desert; they even carried their victorious arms across the desert to Timbuktu. Now, however, they have little or no power south of Atlas, the great chain which traverses the country diagonally northeast to southwest throughout its whole extent. Morocco has three capitals or imperial residences, at one of which the Sultan and his army reside at uncertain intervals and for indeterminate periods. These are Fez (pop. 140,000), Makinas or Mequinez (56,000), and Marrakesh, better known as the City of Morocco (50,000). Besides these the principal coast towns are Tangier; Tetuan, a little way up the Martil River; Larache (El-Arish); Rabat and Sallee, on opposite sides of the Bu-Ragreb River; Casablanca, or Dar-al-Baida; Mazagan; Saffi; and Mogador. The empire is divided into districts named from the occupying tribes; another division is into provinces or districts, fluctuating and very unequal in number, sometimes confined to a single town, sometimes embracing an extensive territory, administered each by a *kaid*, whose chief duty it is to collect the imposts.

Topography.— Physically considered, Morocco falls naturally into four regions: 1. The great range of Atlas, from southwest to northeast, composed of two or more parallel chains. (See Atlas.) 2. Er-Rif or the northern maritime district, comprising the chains of mountains which rise at no great distance from the Mediterranean Sea. 3. The wide belt of fertile plain, intermixed with gentle hill and valley, which lies between the two preceding regions. 4. The plains and valleys southeast of Atlas. The most remarkable natural feature is the great mountain system extending from northeast to southwest. This system — the Atlas — composed of several parallel chains, contains the most elevated points known in North Africa. Miltsin, a peak distant about 30 miles southeast from the city of Morocco, has a height of 11,400 feet, while another peak, Jebel Ayashin, is estimated at 14,600. Adjoining the central chain are several table-lands of great extent, consisting of irregular plains; and at a little distance from it north extends the maritime chain now called Er-Rif, and formerly the Atlas Minor. Its general height is from 2,500 feet to 3,500 feet.

Hydrography.— The rivers flowing from the north side of the Atlas have generally the shorter course, but are well supplied with water; those running south, however far they may extend, are dry in summer, at least in their lower courses. The Muluya, rising in a principal knot of the Atlas, flows in a northeasterly direction to the Mediterranean with a course of 350 miles, and receives many tributaries. Of the rivers which run into the desert, the most easterly, the Ghir, has a course southeast, occasionally traceable for 300 or 400 miles. The Ziz, which, with its numerous affluents, waters a very fertile and populous country, is wholly spent before it attains half that length. The Draa, which rises in the central and most elevated portion of the range of Atlas (lat. 31° to 32° N.), first runs south for nearly 200 miles, forms Lake Ed-Debaya, and then, turning west, enters the ocean in lat. 28° 18′ N., after a course of 700 miles. The lower portion of its bed, however, is periodically quite dry. Lake Ed-Debaya, formed by the floods of the Draa, is reported to be very large; but it disappears annually, and gives way to richly cultivated fields. The fresh-water lake of Jebel el Akhdar (Green Mount) lies about 30 miles north of Morocco. The coast offers few good harbors; of these Tangier and Mogador, or Sweira, are the best; the rest are but open roadsteads at the mouths of rivers.

Natural Resources, etc.— The extent of the mineral wealth possessed by Morocco is not known with any accuracy. Copper, iron, and lead are obtained in larger or smaller quantities. The flora of Morocco includes the esculent oak and cork oak; in the higher regions of the Atlas the cedar and Aleppo pine, with many varieties of oxycedrus and juniper yielding fragrant gums; also the date-palm and the dwarf-palm east and south of the Atlas; and near the coast the *Eleodendron argân*, which yields an excellent oil. Among the wild animals are lions, panthers, ounces, wild boars, gazelles, and several species of large antelope, especially the bubalus. The locust makes its appearance in May, when it lays its eggs. The young brood come forth a month later in countless multitudes, and in another month they take wing, consuming all vegetation in their progress, and spreading desolation over the fields. They are gathered and eaten in large quantities. The ostrich is found on the south frontiers of Morocco.

Climate.— The climate west of Atlas is much more temperate than might be expected under such low latitudes. This is due to the circumstance that a lofty chain of mountains, covered in some parts with perpetual snow, intercepts the hot winds from the deserts of the interior, so that the equable and refreshing sea-breezes prevail throughout the year. Hence the extremes of temperature lie within moderate limits; the thermometer rarely falling below 40° F.

MULEY ABDUL AZZIZ
FORMERLY SULTAN OF MOROCCO.

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in the winter, while it does not rise above 95° in summer. In the region east of the mountains intense cold is felt in winter; while in summer the heat of the plains is insufferable.

Agriculture.— The agriculture of Morocco is in the lowest possible condition, and the annual production is calculated barely to supply the wants of the country; though with proper cultivation and under an enlightened government Morocco might be one of the most productive countries in the world. Unfortunately, owing to oppression and extortion, there is nothing but discouragement for anyone attempting to reap advantage from these resources. The cereal crops are wheat, barley, and maize; but durrah or millet (*Sorghum vulgare*) constitutes the chief support of the population, though beans, the esculent arum, and even canary seed are much eaten by the poorer classes. The vine is cultivated only near towns for the sake of the fresh grapes and for the raisins. All the fruits of the south of Europe are cultivated to some extent. Large numbers of the inhabitants lead a pastoral life, subsisting wholly on the produce of their herds and flocks, or else on game and the wild fruits of the forest. The chief wealth of the tribes scattered over Morocco consists in their herds and flocks. The spirited small horses, for which the country was famous in ancient times, are still numerous, particularly in the southern provinces. Horned cattle are numerous, particularly in the north districts. The bulls are generally tractable, and are employed in the labors of the field — bullocks being little known. The sheep are supposed to number at least 45,000,000; while the goats are estimated at 10,000,000 or 12,000,000, and goatskins constitute one of the principal articles of export.

Manufactures and Commerce.— In general, among the rural population, each family supplies all its own wants. In the towns, however, some manufactures are carried on. Fez makes and exports great quantities of the cloth caps which bear the name of that city. The tanners of Mequinez and other places have a great reputation, and Morocco carpets are much esteemed in Europe. The commerce is partly carried on with the adjacent countries, partly with European states. From the Sudan are obtained ivory, gold-dust, ostrich feathers, asafœtida, gums, Guinea pepper, and slaves. Of the whole of the commerce with Christian states nearly half is carried on with Great Britain. The exports consist of beans, peas, almonds, goatskins, eggs, wool, wax, etc.; the imports, of cottons and other goods. There are no made roads, railways, or canals. Morocco is connected with Spain by telegraph, and the telephone is in use in Tangier, Casablanca, and other coast towns. The posts are under the control of the Moorish, British, French, and German governments.

Money, Weights, and Measures.— Spanish dollars and pesetas, as well as Moorish coins minted for the Government in France are current, but of fluctuating value. The common currency consists of floos (2⅔ cents) the blankeel or muzoona of six floos equaling approximately 16 cents; the okia or ounce of four blankeels, about 64 cents, and the miktal of 10 ounces equaling 76 cents. The kintar of 100 rotals for native produce is equal to about 168 pounds; the kintar for imported articles about 112 pounds. The drak of eight tomins is equal to about 22 inches. The mudd dry measure by which grain is sold equals 1 17/60 bushel; the kula of 28 rotals, by which oil is sold wholesale, equals 47 pounds in weight, or 53 pints by measure.

Government.— The sovereign or Sultan of Morocco, styled by Europeans emperor, bears the title of Emír el Múmenín, or Lord of the True Believers. He is ordinarily called by his subjects simply *Seïd-na* — our Lord. He is absolute in the strictest sense; the lives and properties of his subjects are at his disposal; from him alone proceed the laws, which he makes and unmakes at his pleasure. The imperial revenues are derived from arbitrary imposts on property, from duties on imports and exports, from monopolies, and from fines or confiscations. They amount to about $2,500,000 per annum, which the Sultan receives and disposes of, uncontrolled. Every office is directly or indirectly purchased, small salaries or none are paid, the holders recouping themselves by plunder and oppression, tempered by the fact that at any moment they may be forced to disgorge to the Sultan, or in default be left to rot in the loathsome Moroccan dungeons, or be beaten or tortured to death. All justice is bought and sold. Yet, owing to the religious fanaticism of the people, and the mutual jealousies of the European powers, especially France, Great Britain, Italy and Spain, whose representatives reside at Tangier, these unsatisfactory conditions are preserved. The only European nation which at present has any territory in Morocco is Spain, which maintains a fortress at Ceuta, and four convict settlements, and a fishing station at Ifni. The military force maintained by the Sultan is said to amount to about 100,000 men, of whom a large portion are blacks and Bedawi from the southern desert. About 10,000 are drilled and equipped somewhat like European troops.

Population.— For an estimate of the population of Morocco there are no certain data. One of the most recent calculations estimates it at from 6,000,000 to 6,500,000. An important element of weakness in the social and political constitution is to be found in the several distinct races, which, so far from uniting, repel one another. The Berbers are the oldest inhabitants of the country, and they devote themselves to agriculture rather than to pastoral pursuits. The Arabs form the bulk of the rural population in the plains; some of them are cultivators, and some are Bedawi. In the towns along the coast are found the Moors, a people now physically distinct, whose origin as a distinct race cannot be satisfactorily explained. Their chief physical characteristic is their corpulence, and they are more indolent and much less social than the Arabs. A considerable number of Jews is to be found in all the commercial towns of Morocco, where, in spite of the oppressions to which they are subjected, they often accumulate wealth, being the sole dealers in bullion and holders of capital. To these various ingredients of a checkered population must be added the negroes and their posterity of every shade, who are particularly numerous in the southern provinces. The civilization of Morocco has sunk to a low condition. The education given at the schools in the chief towns, and completed at the University of Fez, does not go beyond the theology of the Koran. The public libraries, once famous, are now dispersed; true science is unknown, and whatever monuments of art are to be found in the kingdom point to the time when literature and art flourished under the Arbabian dynasties in Spain. Music is the only art for which the Moors are said to manifest a decided taste, but they have not as yet arrived at any proficiency in it.

History.— In the Mauri of ancient writers it is easy to recognize the Moors of modern times. These people were supposed to have come from Asia, and particularly from Palestine, but their origin is doubtful. The Berbers are believed to be the representatives of the race that inhabited the country in the earliest historical times. After being for more than four centuries a part of the Roman empire, and in the later period of its sway veneered with a corrupt Christianity, «Mauritania Tingitana» fell (429 A.D.) into the hands of the Vandals, who introduced the piratical habits which afterwards became so characteristic of the coasts of Barbary and Morocco. They held it till 533, when Belisarius having defeated them, it became subject once more to the Eastern empire. But in the latter part of the 7th century the Arabs spread over North Africa, and having taken possession of Mauritania, penetrated to the borders of the desert. About this time the Jews were expelled from Spain by decree of the Council of Toledo (694 A.D.), and sought refuge in great numbers on the shores of Africa. Near the close of the 8th century a Sherif or descendant of Mohammed named Edris obtained such an ascendency over the Berber tribes that they made him their sovereign, with the title of Imâm. His son and successor founded in 807 the city of Fez. In 1035 the warlike sect of the Morabites rose into existence on the borders of the desert. In 1055 their chief was proclaimed sovereign of Moghreb-el-aksa. His grandson and successor crossed the mountains, and in 1072 laid the foundations of the city of Morocco, which thus arose with the remarkable dynasty of the Morabites. The expulsion of the Moors and Jews from Spain (1840–1501 A.D.) added 800,000 souls, it is said, to the population of Moghreb-el-aksa. In the middle of the 16th century a new dynasty commenced with the descendants of the Sherif Hosein. The fifth of this family, commonly called Hamed Sherif el-Mansú (1579–1603), made himself master of the whole of Moghreb-el-aksa, and pushed his conquests through the desert as far as Timbuktu and Kaghó. His reign is regarded as the golden age in the history of Morocco. The ninth and last Moroccan dynasty is that founded in 1648, by Mulai Sherif el Fileli, or King of Tafilelt. In 1814 the slavery of Christians was abolished, and piracy was prohibited in 1817. Several complications arose with France, caused by the plundering of French vessels by pirates, but in each instance the emperor gave compensation. In 1859-60 there was a war with Spain, owing to attacks made by some of the wild tribes upon the Spanish territory; it resulted in a cession of land and an indemnity of $20,000,000 to Spain.

The present Sultan Abdul Aziz IV. succeeded his father El Hasan III., in 1894, when he was 14 years of age. For seven years the government was in the hands of the grand vizier Si Ahmed Ben Misa who ruled despotically and kept the country well under control. At his death in May 1900, the Sultan virtually commenced his reign, and well-educated, of a liberal frame of mind, attempted to introduce reforms of a European character, which aroused the antagonism of his subjects, and a rebellion resulted under the leadership of Omar Zaraburi his elder brother. The royal troops were defeated, the Sultan and his capital invested, and the insurrection was for a long time unchecked. With the financial assistance of France, the Sultan's troops, at length, made his position comparatively secure, although his brother was left in possession of the imperial fortress of Taza, three days journey from Fez, and the country was kept in a continuous state of disturbance by bold acts of brigandage on the part of rebel leaders. On 18 May 1904, Rais-Uli, a prominent chieftain, captured and held for ransom, the Hon. Ion Perdicaris, an American subject, and his stepson Mr. Varley, an English subject. The ultimatum of the United States secretary of state, John Hay, "Perdicaris alive, or Rais-Uli dead," a naval demonstration of American warships, and representations from European courts, compelled the Sultan to comply with Rais-Uli's demands, and the captives were released. The Sultan's weakness became more and more apparent to the insurgent tribes of northern and central Morocco, and contempt for the rights of foreigners, with utter lawlessness prevailed throughout the kingdom. At the ports, especially Tangier, the property of Europeans, and even their lives, were in jeopardy. To safeguard the loan of $10,000,000 which had been advanced to the Sultan, the French Government arranged for the appointment of a French financial adviser, with agents, to undertake the control of the Customs; it was also arranged to police Tangier with French-Algerians, and a French military mission proceeded to Fez. By the Anglo-French Agreement of 8 Apr. 1904, France as the nation whose dominions bordered on Morocco, was to be unhindered by Great Britain in guarding the tranquility of that kingdom, in return for allowing Great Britain freedom of action in Egypt; moreover, freedom of trade was guaranteed for 30 years in Egypt and Morocco. In Oct. 1904, a Franco-Spanish Agreement was also arranged, which recognized the terms of the Anglo-French Agreement, the maintenance of the territorial integrity of Morocco, the neutralization of the coast between Melilla and the Sebu river, the preponderating right of France to give the Sultan military, economic, and financial assistance, and modified the limits of the Spanish sphere of influence. In Jan. 1905, the reforms submitted by the French Government were received with marked disfavor by the Sultan and by his Council of Notables. This was thought later to have been due to German diplomacy, which under the terms of the Madrid Convention of 1880, refused to recognize the agreements made by France with Great Britain and Spain concerning Morocco.

In 1880, the Madrid Convention with Morocco bearing the signatures of Austria, Belgium, Denmark, Germany, France, Great Britain, Italy, Morocco, the Netherlands, Portugal, Spain, Sweden, and Norway, and the United States, had established the right of protection in Morocco, and the 17th article of the treaty reads:

"The right to the treatment of the most favored nation is recognized by Morocco, as belonging to all the Powers represented at the Madrid Conference."

The German opposition was further emphasized by the visit of the German Emperor, William II. to Tangier, 31 Mar. 1905, when he assured the Sultan of his intention to uphold the integrity of the Moroccan kingdom, and the equality of Germany's commercial and economic interests in the country. A special German mission was sent to Fez, and British and Spanish missions also proceeded to the Moorish capital, ostensibly to support the French policy. The Sultan and his advisers, 28 May 1905, refused to entertain the proposed reforms and advised an international conference of the Powers to deliberate on the Moroccan situation. After protracted negotiations between France and Germany, which were shadowed by rumors of probable war between the countries, and in which the resignation of M. Delcassé, the French minister of foreign affairs, and the downfall of the Rouvier ministry were incidents, a programme was arranged to place before the International Conference. Algeciras in Spain, opposite Gibraltar, was chosen as the meeting place.

Various reasons were assigned for the unexpected raising of the Moroccan question by Germany; among these were — alarm at the apparent isolation of Germany in European politics, at the increase of French influence in North Africa, and at the consummation of an agreement which implied a further territorial division of Africa by private arrangement between two powers, regardless of German and other economic rights.

The various countries, signatory to the Madrid Convention of 1880, sent delegates to Algeciras, and the conference was opened 16 Jan. 1906. The presence of the United States representatives was explained as safeguarding the nation's commercial interests in Morocco; with the political aspects of the Conference, arising solely from the strained relations between Germany and France, wherein a *casus belli* might be found, the United States agents were specifically instructed not to participate. The meetings of the Conference lasted until 31 Mar. 1906, when after strenuous opposition and counter-proposals on the part of Germany, supported only by Austria, against the French programme, supported by Great Britain, Russia, Italy, Spain, Portugal, the United States, Belgium, and Holland, an agreement on all points was reached. The French programme maintained that the police under the Sultan's orders, should be commanded by French and Spanish officers and sub-officers nominated to the Sultan and appointed by him, and that the Inspector-General of the police should report to the Sultan. Germany made a series of propositions in opposition to this general plan, seeking to bring the whole Moroccan business practically under the control of the European concert, requiring those Powers directly acting in Morocco to take a European mandate, and to be subject to the interposition of the other Powers, of which Germany would be an important one. Matters had almost reached a deadlock when a proposition relative to a mixed police force for the ports in dispute, was brought forward by Ambassador White, under instructions from President Roosevelt, and introduced by the Russians, provided a solution for the existing difficulties. The division and the policing of the ports of Morocco was arranged as follows: Spain to police Tetuan and Larache; a Franco-Spanish mixed police to be established at Casablanca and Tangier, and a French police force alone to have charge of Mogador, Saffi, Mazagan, and Rabat. The result of the conference was virtually a victory for France, which retains the preponderance of influence in the financial affairs of the kingdom, and loses little of what was demanded with regard to the policing of the country.

Consult Amicis, 'Morocco and its People' (1879); Bonsal, 'Morocco as it is' (1892); Hay, 'Morocco and the Moors' (1896); Meakin, 'The Land of the Moors' (1901).

Morocco, or **Marrakesh,** the second capital of the sultanate of Morocco (q.v.), on the north side of an extensive and fertile plain, 1,500 feet above sea-level, about 96 miles from Mogador, its port on the Atlantic, and 230 miles southwest of Fez, the chief capital of the empire. It has an excellent situation in sight of the Atlas mountains, from which cool streams are always flowing, and is noted for its genial and healthful climate. It commands the trade routes across the mountains, but the city has long been hastening to decay, chiefly the result of war, plague, and wretched government. It is encircled by a lime and earth wall nearly six miles in circuit, between 20 and 30 feet high, with square towers every 50 paces, and pierced by nine gates, but all in a ruinous condition. A large portion of the immense space within the walls is occupied by ill-kept gardens, open areas, and «soks,» or market-places; the eight large cemeteries are outside the walls. In the bazaar and merchants' quarter a considerable local trade is carried on with the country people, the mountaineers from the neighboring Atlas, and with Sus, Tafilet, Mazagan, Saffi, and Mogador. Morocco possesses many mosques, one of which, the Kutubia, has a tower after the model of the Hassan in Rabat and the Giralda in Seville, 320 feet high. On the south of the city stands the palace, comprising a space of about 1,500 yards long by 600 yards wide, and near it is the Jews' quarter (El-Millah), a walled enclosure of about one and one half miles in circuit, one half of it nearly in ruins, thronged to suffocation, and excessively filthy.

There are several tanning and leather-dyeing establishments of considerable extent, though of late years European goods have been gradually displacing native manufactures. The population varies according to the presence or absence of the Sultan, his court, and army. Morocco was founded in 1072 by the Emir Yusef ben Tachefyn, and reached the summit of its prosperity in the 13th century. In those days it is affirmed to have contained more than 700,000 inhabitants. During several centuries it suffered from civil wars, and was sacked by the rebellious Berbers more than once. Pop. estimated at from 50,000 to 60,000.

Morocco, or **Maroquin,** a fine kind of leather, prepared from the skin of the goat, originally brought from the Levant and the Barbary States, but now manufactured in most other countries. The colors most commonly communicated to it are red (by cochineal) and yellow (by the Avignon or yellow berries). See also Leather.

Morong, Thomas, American botanist: b. Cahaba, Ala., 1827; d. 1894. He went in boyhood to Massachusetts, and was graduated at Amherst College in 1848. After studying law he pursued a course in theology at Andover, leaving the seminary in 1853. He had early developed an interest in botany, and in 1888 began a voyage which led to valuable explorations and botanical collections made in Argentina, Chile, and Paraguay. Returning in 1890, he became curator of the Columbia College herbarium. With N. L. Britton (q.v.) he published ‘An Enumeration of the Plants Collected by Dr. Thomas Morong in Paraguay, 1888–90.’

Mórong, mō'rŏng, Philippines, a pueblo of the province of Rizal, Luzon, situated on the Bay Lagoon (Laguna de Bay), 19 miles southeast of Manila. It was formerly the capital of the province of Mórong. Pop. 9,430.

Moroni, Giovanni Battista, jō-vän'nē bät-tēs'tä mō-rō'nē, Italian painter: b. Bonda, near Albino, 1525; d. Bergamo 5 Feb. 1578. He painted many altarpieces and historical compositions, some of which are to be found in the Brera Library at Milan, others in villages of the province of Bergamo. He was, however, most especially celebrated for his portraits which are lifelike and arrest the attention by their startling projection and lucid color tone. Many of them are to be met with in Italy. There are three examples in the Berlin Museum and five in the London National Gallery, amongst which is ‘The Tailor,’ a masterpiece. One picture of this master is in the Pinakothek at Munich.

Moros, mō'rōz, people of the Malay race inhabiting the southwestern part of the Philippines, chiefly the Sulu Archipelago and the islands of Palawan and Mindanao; various subdivisions include the Illanos, Samales, Joloanos, Maguendanaos, etc. Mohammedanism was propagated among the Moros in the 14th century by Malays from the island of Borneo, and is the prevailing religion. The Moro alphabet, which is still retained in writing, shows distinct traces of Arabic origin introduced by Arabic teachers of the doctrines of Islam. The Moros are governed by their local chiefs, dattos or sultans, under a form of primitive feudalism.

They have no system of laws as such. The penal passages of the Koran, taken in connection with local customs, are referred to as the *Titab;* the local customs being mainly interpretations or even evasions of the Koran. Land is held in common, the dattos claiming sections as their own; in some localities, a «Master of the Field» allots plots of ground to individuals for permanent or temporary occupancy. Such real estate may not be alienated without permission having first been obtained from the authority granting residence thereon. Slavery and polygamy prevail among them; and they have for many years engaged in piracy and predatory expeditions against the neighboring Filipinos. Their religion and peculiar customs, as well as their spirit of independence have made the government of their country one of the greatest problems of the United States occupation of the Philippines. The Sulu Archipelago in 1901 was placed under military supervision and government in accordance with a treaty made by the United States representative and the Sultan of Sulu, whose power, however, is diminishing among his people (see Sulu). In 1903 a law was passed by the Philippine Commission providing government for the Moro country of Mindanao and adjacent islands; this act provides that the civil governor of the Philippine Islands shall appoint for the Moro Province a governor, attorney, secretary, treasurer, superintendent of schools and an engineer; these officials also constitute a legislative council of which the governor is presiding officer. The provincial governor and engineer may be officers of the army detailed on request of the Philippine Commission by the commanding general of the division of the Philippines to perform the civil duties of such office.

It is further provided that the legislative council shall enact laws for the organization of a school system; for the creation of local governments among the Moros and other non-Christion tribes, also laws investing district governors with the power of adjusting under the supervision of the provincial governor, all differences between sultans, dattos and any independent local authorities; shall collect and codify the laws of the Moros and make them consistent with the laws of Congress; provide courts; and enact laws providing for the abolition of slavery and the suppression of all slave hunting and slave trade. The lessening of the evils of slavery has received particular attention from the American authorities from the first. The Moros were informed in 1900 that slaves who sought the protection of the United States garrison would be considered free and their freedom enforced. The datto at Zamboanga in 1901 abolished slavery among his followers. In 1903 the legislative council of the Moro province passed a law prohibiting slave hunting in all the province, which law was immediately confirmed by the Philippine Commission.

Morosau'rus, a genus of sauropodous dinosaurs (q.v.), with an extremely long and flexible neck, and small body; found fossil in the Upper Jura beds of Wyoming and Colorado. It was related to Brontosaurus (q.v.).

Morosini, Andrea, ān-drā'ä mō-rō-sē'nē, Venetian historian: b. Venice 13 Feb. 1558; d. there 29 June 1618. He was educated in belles-lettres at Padua, and from 1583 was in the service of the state. In 1600 he entered the senate, later was three times elected to the Council of Ten, and in 1598 was made official historiographer of the republic to continue the work of Paolo Paruta. He was given access to the state papers as far as 1594. His history, ‘Historia Veneta ab Anno 1521 ad Annum 1615,’ appeared in 1623 (2d ed. 1719), and has been esteemed for its accuracy and elegant Latinity.

Morosini, Francesco (called the Peloponnesiac), Venetian soldier: b. Venice 1618; d. Napoli di Romagna 6 Jan. 1694. He was a leading military commander of his day, and four times made generalissimo of Venetian forces. His career was almost a continuous struggle with the Turks. In 1656 he became governor of Candia, but in 1669 was compelled to surrender the island to Mehemet Koprili. His sobriquet was gained by later victories in the Morea. From 1688 he was doge of Venice. Daru (‘Histoire de la République de Venise’ 1819; 4th ed. 1853) calls him «the last of the Venetians.»

Morpheus, môr'fūs, in classical mythology, a minister of the god Somnus, sometimes called the god of sleep. He is generally represented as a slumbering child, of great corpulence, wearing wings, and holding a vase in one hand, and in the other some poppies.

Morphine, an alkaloid occurring in opium, and having the chemical formula $C_{17}H_{19}NO_3 + H_2O$. In preparing it, the opium is extracted with water at 100° F., calcium carbonate is added, and the solution is evaporated to a small bulk. Calcium chloride is then added, to precipitate the meconic acid that the extract contains, and after filtration the solution is evaporated. Calcium meconate separates out first, after which crystals of the hydrochlorides of morphine and codeine are deposited. The latter crystals are re-dissolved in water and treated with ammonia, the morphine being thereby precipitated while the codeine remains in solution. Morphine dissolves in 1,000 parts of cold water, and in 500 parts of boiling water. It is also readily soluble in hot alcohol, but is insoluble in ether. It is bitter and very poisonous, and crystallizes in small trimetric prisms. Morphine acts as a base toward acids, and numerous salts of the alkaloid are known. In medicine, morphine is usually administered in the form of the sulphate or some other salt. When morphine is heated with hydrochloric acid for two or three hours at a temperature of about 290° F. (sufficient pressure being exerted upon the solution to make this possible), it becomes converted into another alkaloid which has the formula $C_{17}H_{17}NO_2$, and is known as «apomorphine.» Apomorphine is also poisonous, and its salts, when administered in small doses, cause vomiting. Special attention has been paid, by chemists, to the positive identification of morphine, owing to the frequent importance of such identification in medical jurisprudence. The subject is full of technical difficulties, especially when (as is commonly the case) morphine, if present, is mingled with large quantities of animal tissue, from which it must be separated before the tests are applied. Many such tests are known, of which the following are the most familiar: (1) A neutral solution of a ferric salt, when added to a neutral solution of a morphine salt, gives a blue color which is destroyed by heat, by alcohol, and by acids. (2) If iodic acid and starch are added to a weak solution of a morphine salt, and a weak solution of ammonia is floated upon the mixture, a brown ring below a blue ring will be formed at the bounding surface that separates the liquids from each other.

Morphol'ogy, the division of biological science which deals with the structure and *form* of animals and plants, from Gr. *morphē*, form, and *logos*, doctrine, the term being equivalent to «science of form.» The investigation of the structure of living organisms is the only true method by which we may become acquainted with their relations to each other, singly or in groups. Morphology thus lies at the foundation of physiology, and all true systems of classification and explanations of serial development. Goethe was the inventor of the term, and was the first to direct attention to relations in structure presented by living beings, although the terms as employed by Goethe had reference rather to the unvarying phenomena of animal and vegetable life than to the more specific sense in which modern biologists use the name. The modern morphologist must consider not only comparative anatomy but embryology, and include in his science an investigation of the past history and development changes of each subject — its phylogeny as well as ontogeny. The science, in truth, is now a study of the facts of phylogeny. The results of this science form the substance of text-book knowledge, and the terms, which are the names of the parts of animals, are defined in all good dictionaries. For a general outline of the morphology or structure of animals or plants see respectively ANATOMY, COMPARATIVE, or ANATOMY OF PLANTS.

Morphy, môr'fĭ, **Paul Charles,** American chess-player: b. New Orleans, La., 22 June 1837; d. there 10 July 1884. He showed his fondness for chess at a very early age, and at 12 had defeated many of the local amateurs. At the College of South Carolina he studied law for several years, occasionally playing a game. In 1857, at the first American chess congress held in New York he had no difficulty in defeating his strongest opponents. During the next year, in England, he successfully met such players as Bird, Boden, and Löwenthal, and astonished the world of chess by playing as many as eight games simultaneously and without the board. His playing in Paris, where he won five games out of eight against Harrwitz, and exhibited his blindfold skill, was equally surprising. In 1859 he returned to the United States and here met the famous German player Anderssen, winning 7 out of 11 games. Being now admitted to the bar, Morphy began to practise law in his native city; but his mental powers had been so impaired by the strain of his blindfold chess-playing that he not only gave that up, but relinquished chess entirely, and a little later abandoned all intellectual work. Morphy's skill at chess appeared to partake of the quality of genius. His brilliant achievements were not the result of long or deep deliberation, yet displayed all the elements usually observed when mental strength and quickness are sustained by profound study. Consult Löwenthal, 'Morphy's Games of Chess' (1860).

Morrell, Imogene Robinson, American artist: b. Attleboro, Mass.; d. Philadelphia 22 Nov. 1908. She was married to Abram Morrell in 1869. She studied art in the United States and Europe and was a pupil of Adolf Schrodter at Düsseldorf, and of Couture at Paris (1864). In 1874 she returned to America where she opened a studio at Washington as a portrait and historical painter, and there established and became first president of the Washington National Academy of Fine Arts 1879. Twelve medals have been awarded to her paintings. Some of the more notable are: 'The First Battle of the Puritans'; 'Washington Welcoming the Puritan Trains at Newburgh, N. Y.'; 'Portrait of General John A. Dix.'

Morrill, mŏr'ĭl, **Anson Peaslee,** American politician: b. Belgrade, Maine, 10 June 1803; d. Augusta, Maine, 4 July 1887. He at first engaged in business in his native town, then in 1833 was sent to the State legislature, and in 1839 received the appointment of sheriff of Somerset County. This position he held till 1840. In 1850 he was appointed land agent. In

1853 he was an unsuccessful candidate for governor on the Prohibition and Free-Soil tickets, but the following year he was elected as the first Republican governor of Maine, and later was a delegate to the convention which nominated Frémont. In 1860 he was elected to Congress, but declined a re-election.

Morrill, Justin Smith, American senator: b. Strafford, Vt., 14 April 1810; d. Washington, D. C., 28 Dec. 1898. He received a good primary and secondary education, was a merchant and then a farmer; was elected to the House of Representatives in 1854, and was re-elected five times; in 1867 was transferred to the Senate, in which he was long chairman of the committee of finance. With his 12 years in the lower house and 31 in the upper he was more closely connected with Congress than any other man of his time, and was styled «The Father of the Senate.» He introduced the war revenue tariff of 1861, commonly called the Morrill tariff, and during his later years consistently opposed the remonetization of silver. Senator Morrill wrote ‘The Self-Consciousness of Noted Persons’ (1886).

Morrill, Lot Myrick, American politician: b. Belgrade, Maine, 3 May 1813; d. Augusta, Maine, 10 Jan. 1883. He was educated at Waterville College (now Colby University), studied law and was admitted to the bar in 1839 when he went to Augusta and established a law practice. He took an active part in politics, in 1854 was elected to the legislature and in 1856 was chosen president of the senate. He was governor of his State 1858–60 and in the latter year was elected to the United States Senate where he proved himself an indefatigable worker. He favored the resumption of specie payment and was an authority on financial, naval, and Indian affairs. In 1876 he retired from the Senate to become secretary of the treasury under President Grant and during his administration of that office constantly urged the return to specie payment. He declined an appointment to a foreign mission under President Hayes and in 1887 became collector of customs at Portland, Maine, in which office he died.

Mor'ris, Benjamin Wistar, American Protestant Episcopal bishop: b. Wellsborough, Pa., 30 May 1819; d. Portland, Ore., 8 April 1906. He was graduated from the General Theological Seminary in 1846, and held successive rectorates in Sunbury, Manayunk, and Germantown, Pa. He was consecrated missionary bishop of Oregon and Washington in December, 1868, and on the division of the diocese in 1880, became bishop of Oregon. He has published ‘Presbyterian, Baptist and Methodist Testimony to Confirmation.’

Morris, Charles, English song writer: b. 1745; d. near Dorking, Surrey 11 July 1838. In 1764 he entered the 17th foot, with which he served in America, later exchanged into the Irish Dragoons and the 2d life-guards, in 1785 was made bard of the Beefsteak Society, and before its gatherings sang many of his wittiest efforts. His humor and vivacity led Curran to say, «Die when you will, Charles, you will die in your youth.» He wrote hundreds of songs, many being political ditties for the Whigs; and a posthumous volume, ‘Lyra Urbanica’ (1840) collected them. His ‘A Reason Fair to Fill my Glass’ was praised by Moore and set to music by Charles Dibdin.

Morris, Charles, American naval officer: b. Woodstock, Conn., 1784; d. 1856. Entering the navy in 1799, he participated in the war with Tripoli, was an actor in the recapture of the Philadelphia, in the harbor of Tripoli (1804), being the first to gain her deck when she was boarded. At the outbreak of the War of 1812 he was serving as executive officer of the Constitution; he was wounded in the engagement of «Old Ironsides» with the Guerrière; and afterward successfully commanded the John Adams until, being blockaded by a British squadron in Penobscot River, he was compelled to destroy his ship to save her from being taken by the enemy. In the war with Algiers he commanded the Congress, and it was he who, in the Brandywine, carried Lafayette home to France. After serving for some years as naval commissioner, and as supervisor of the United States Naval Academy, he became chief of the bureau of ordnance and hydrography, which position he held till the time of his death. Consult his ‘Autobiography’ (1880).

Morris, Charles, American author: b. Chester, Pa., 1 Oct. 1833. He was educated in Chester, and became professor in the Academy of Ancient and Modern Languages, Philadelphia; afterward engaged in business; and since 1878 has devoted himself to literary work, giving special attention to historical and scientific subjects. His publications include: ‘A Manual of Classical Literature’; ‘The Aryan Race’; ‘Tales from the Dramatists’; ‘The War with Spain’; ‘Our Nation's Navy’; ‘Famous Men and Great Events of the 19th Century,’ etc. He has also edited ‘Half Hours with the Best American Authors,’ ‘The Encyclopedia Dictionary,’ and other works.

Morris, Clara, American actress: b. Toronto, Canada, 1849. In 1869 she became the leading lady in Wood's Theatre, Cincinnati, Ohio, and in the winter of 1869–70 joined Augustin Daly's Fifth Avenue Company, New York. She at once achieved success in emotional roles, and afterward made many tours throughout the United States. Her leading roles include ‘Camille’; Alixe in the ‘Countess de Sommerive’; ‘Mercy Merrick’; ‘Miss Multon’; Lady Macbeth; ‘Leah the Forsaken’; and Cora in ‘L'Article 47.’ She wrote much for periodicals, and published in book-form; ‘A Silent Singer’ (1899); ‘My Little Jim Crow’ (1900); ‘A Pasteboard Crown,’ a work of fiction (1902); and ‘Stage Confidences’ (1902). She was married to F. C. Harriott in 1874.

Morris, Daniel, British colonial expert: b. Loughor, Glamorgan, 26 May 1844. He was educated at Cheltenham, at the South Kensington Royal College of Science, and at Trinity College, Dublin, where he received high honors. He was assistant director of the Royal Botanic Gardens of Ceylon in 1877; investigated and checked the coffee-leaf disease; became director of the Botanic Department of Jamaica in 1879, assistant director of the Royal Gardens at Kew in 1886, treasurer of the Royal Horticultural Society in 1896, and Commissioner in the West Indian Imperial Department in 1898. Among his publications are: ‘Cacao: How to Grow and How to Cure it’ (1882); ‘Agricultural Resources of St. Helena’ (1884); ‘The Vegetable Resources of the West Indies’ (1888); ‘Sisal Industry of the Bahamas’ (1896); and ‘Cantor Lectures on Plants yielding Indiarubber’ (1898).

Morris, Edward Joy, American author: b. Philadelphia, Pa., 16 July 1815; d. there 31 Dec. 1881. He was graduated from Harvard in 1836 and was admitted to the bar in 1842. He was a member of the Pennsylvania legislature in 1841–3 and of Congress in 1843–5 and in 1850 was appointed to a mission in Naples where he remained four years. He was again in Congress in 1858–61 and was then appointed minister to Turkey by President Lincoln and continued in office until 1870. He published: ‘Notes of a Tour through Turkey’ (1842) and numerous translations.

Morris, Edward Parmelee, American Latinist, best known as a Plautine scholar: b. Auburn, N. Y., 1853. He was graduated at Yale in 1874, studied at Leipsic and Jena, was professor of Latin at Williams 1885–91, and since the latter date at Yale, and edited the following plays of Plautus: ‘Mostellaria,’ ‘Pseudolus’ (1890), and ‘Captives and Trinummus’ (1898).

Morris, George Perry, American journalist: b. Montclair, N. J., 18 Feb. 1864. He was educated at Rutger's College and Johns Hopkins University, and in 1891 was associate editor of the Boston ‘Congregationalist.’ In 1898–1900 he was editor of the New York *Mail and Express*. He has published: ‘The Norwegian Company System’ (1894); ‘Historic Towns of New England’ (1898); etc.

Morris, George Pope, American journalist and poet: b. Philadelphia 10 Oct. 1802; d. New York 6 July 1864. With Samuel Woodworth (q.v.), in 1823, he founded the New York ‘Mirror,’ a weekly journal of literature, afterward published as the ‘New Mirror’ and the ‘Evening Mirror,’ in which many of the early writings of Bryant, Poe, Halleck, Willis, and other American authors first appeared. In 1845 Morris established the ‘National Press,’ which in the following year became the ‘Home Journal,’ and which, with the assistance of N. P. Willis (q.v.), he continued to edit almost to the end of his life. He wrote ‘Briarcliff,’ a popular drama (1825), and edited ‘American Melodies’ and (with Willis) ‘The Prose and Poetry of America’ (1845). His ‘Poems’ (final collection, 1860) included «Woodman, Spare that Tree»; «A Long Time Ago»; «My Mother's Bible»; and other well-known pieces.

Morris, George Upham, American naval officer: b. Massachusetts 3 June 1830; d. Jordan Alum Springs, Va., 15 Aug. 1875. He was appointed midshipman in the navy in 1846 and received steady promotion. In 1862 he was made lieutenant-commander and assigned to the Cumberland and was in temporary command of her when she was attacked by the Merrimac in Hampton Roads. The gallant seamanship displayed by Morris on this occasion elicited the admiration of the country. He refused to leave the ship and stood at his post as she went down but was rescued by some of his men. He afterward had command of the gunboat Port Royal and was engaged on the James River, at Fort Darling, and later at Fort Powell and at Grant's Pass. He was promoted commander in 1866 and retired from active service in 1874.

Morris, Gouverneur, American statesman: b. Morrisania, N. Y., 31 Jan. 1752; d. there 6 Nov. 1816. He was graduated in 1768 from King's College (now Columbia University); after study of the law was licensed in 1771 to practice as an attorney; did excellently well at the bar; and during the earlier difficulties between Great Britain and the American colonies maintained a conservative attitude and was eager to effect a compromise. He finally, however, identified himself with the patriot cause, and was elected from Westchester County to the provincial congress of New York, 70 of whose 81 delegates met on 22 May 1775 at New York. In this assembly he became the leader of the patriotic party, and made an able speech favoring the adoption of the recommendation of the Continental Congress that the colonies establish new governments. A delegate to the constitutional convention of New York, he was chosen to the committees for drafting a plan for the constitution — in which Livingston and Jay were also prominent — and for establishing a State fund. In 1777–80 he was a member of the Continental Congress, and almost immediately upon taking his seat was appointed one of a committee of five to visit Valley Forge and examine the condition of the troops. Early in 1779 he was made chairman of the important committee for receiving communications from our ministers abroad, and from the envoy of France. In this capacity he drew up the draft of instructions to the ministers which was adopted by Congress and formed the basis of the treaty of peace with Great Britain. In February, 1780 he began the publication in the ‘Pennsylvania Packet’ of a series of essays on American finances, in which he endeavored to show the wisdom of the colonists submitting to a reasonable taxation and outlined a scheme for such assessment. These essays influenced his appointment in 1781 as assistant financier, a post he successfully filled until 1785. He was really the founder of the national coinage, though his plan was later modified by Jefferson and Hamilton; he introduced the decimal notation and devised the word «cent» to indicate one of the lesser coins. In 1787 he was a delegate to the constitutional convention, and there he advocated a strongly centralized government, and finally revised the draft of the instrument. He was in France in 1788–91 for the transaction of private business, and in 1791 was appointed by Washington a confidential agent to treat with Great Britain regarding certain unfulfilled articles of the treaty of peace. In 1792–4 he was minister to France, and in 1800–3 was United States Senator, filling a vacancy. He supported the Louisiana Purchase, but opposed the abolition of direct taxes and of the judiciary system. In 1810–13 he was chairman of the Erie canal commission; in the entire plan for this waterway, which he wished to make large enough for ships, he was a leader. He was keen in intellect, an excellent orator, and rendered notable services to America. During the War of 1812 his ultra-Federalist views led him into positions that were extravagant and unwise. He pronounced funeral orations on Washington, Hamilton, and Clinton; published pamphlets and addresses; and latterly contributed to newspapers political satires in both prose and verse. Consult: Sparks, ‘Life’ (1832); Roosevelt, ‘Life’ (1888: ‘American

Statesmen' series); Morris (A. C.), 'Diary and Letters of Gouverneur Morris' (1888).

Morris, Gouverneur, American novelist, great-grandson of the preceding: b. New York 7 Feb. 1876. He was graduated from Yale in 1898 and has published 'A Bunch of Grapes' (1897); 'Tom Beauling' (1901); 'Aladdin O'Brien' (1902).

Morris, Harrison Smith, American author: b. Philadelphia 4 Oct. 1856. He was educated in the public schools, and early began to do literary work. Since January 1899 he has been editor of 'Lippincott's Magazine.' He is versed in the history of art, and is managing director of the Pennsylvania Academy of Fine Arts, in Philadelphia. He has written: 'A Duet in Lyrics,' poems, with J. A. Henry (1883); 'Tales from Ten Poets' (1893); 'Madonna and Other Poems' (1894); a continuation of Lamb's 'Tales from Shakespeare' (1893); and has edited 'In the Yule Log Glow' (1892) and 'Where Meadows Meet the Sea' (1892).

Morris, Henry W., American naval officer: b. New York 1806; d. there 14 Aug. 1863. He entered the navy in 1819 and in 1828 was made lieutenant. He was on duty in New York and various other stations from 1839 until 1855 when he was fleet-captain in the Mediterranean under Commodore Stringham. In 1861 he superintended the completion of the Pensacola and in 1862 took command of her, successfully passed the Confederate fortifications on the Potomac and took a distinguished part in the battles at Fort Jackson, Fort St. Philip and Chalmette. He guarded New Orleans after its capture but failing health necessitated his return to the North where he soon after died. He was promoted commodore in 1862.

Morris, John Gottlieb, American Lutheran clergyman: b. New York 14 Nov. 1803; d. Lutherville, Md., 10 Oct. 1895. He was graduated from Dickenson College in 1823 and studied theology at the Princeton and Gettysburg Seminaries, receiving his license to preach in 1826. He founded the 1st English Lutheran Church of Baltimore and was in charge of it in 1827–60 after which he held various important charges. He was chiefly instrumental in the founding of the College for Women in Lutherville and of the town. From 1834 until his death he was lecturer at Pennsylvania College and he also lectured in the Smithsonian Institution at Washington. He was prominently connected with scientific and religious societies and founded the 'Lutheran Observer' in 1831 which he edited until 1833. Among his many publications are: 'Catechumen's and Communicant's Companion' (1831); 'Life of John Arndt' (1853); 'Fifty Years in the Lutheran Ministry' (1878); 'Memoirs of the Stork Family' (1886); etc.

Morris, Lewis, American statesman: b. New York 1671; d. Kingsbury, N. J., 21 May 1746. He practised law in New York, was judge of the superior court of New York and New Jersey in 1692, became one of the governor's council and a member of the assembly, and drew up and presented to Queen Anne the complaint against Governor Cornbury formulated by the assembly. In 1710–38 he was chief-justice of New York and New Jersey, in 1731 was acting governor of New Jersey, in 1738 was prominent in effecting the separation of New Jersey from New York, and from 1738 until his death was governor of New Jersey.

Morris, Lewis, American patriot, one of the signers of the Declaration of Independence: b. Morrisania, Westchester County, N. Y., 1726; d. there 22 Jan. 1798. After being graduated at Yale College in 1746, he engaged in farming on a very extensive scale on his paternal estate at Morrisania. He took strong ground against the act of Parliament compelling the inhabitants of the province of New York to furnish with supplies the foreign troops quartered upon them. He was elected to the Congress of 1775, was a member of the committee to devise means for supplying the colonies with munitions of war, and after the close of the session was sent west to detach the Indians from the British. In 1776 he resumed his seat in Congress, and signed the Declaration of Independence, although his estate was at that time in the hands of the enemy. As a consequence his manor was laid waste, and his family expelled. In 1777 he was succeeded in Congress by Gouverneur Morris, his half brother, but afterward served in the State legislature. The latter part of his life was spent at Morrisania. He was one of the boldest and most zealous promoters of the Revolution.

Morris, Sir Lewis, Welsh poet: b. Carmarthen, Wales, 23 Jan. 1833; d. London, Eng., 12 Nov. 1907. He was educated at Oxford, studied law and was admitted to the bar of Lincoln's Inn in 1861, practising until 1881. Was deputy chancellor of University of Wales and prominently associated with the cause of education. In 1895 he was knighted. His verse was fluent, but deficient in strength, and was very popular, his 'Epic of Hades' (1876–7) going through many editions. Other volumes of his verse are: 'Songs of Two Worlds' (1872–5); 'Gwen: a Drama in Monologue' (1879); 'The Ode of Life' (1880); 'Songs Unsung' (1883); 'A Vision of Saints' (1890); 'Harvest Tide' (1901); etc.

Morris, Mary Philipse, American Tory: b. Philipse Manor, New York, 1730; d. York, England. She was one of the famous Philipse family, daughter of the second lord of the Manor, Frederick Philipse. A beautiful brunette, she is the original of Cooper's heroine in 'The Spy,' and was long said to be one of George Washington's loves; but the story that she rejected him is untrue. Two years after meeting Washington she married George Morris (1758), with whom she lived in what was afterward Washington's headquarters and the Jumel house. Her property was confiscated at the opening of the Revolution, and she went to England. Her surviving children, being free from attaint according to the ruling of the English attorney-general, sold their rights to John Jacob Astor for £20,000; and the British government paid them £17,000 more for their losses.

Morris, Robert, American financier and statesman, a signer of the Declaration of Independence: b. Liverpool, England, 31 Jan. 1734; d. Philadelphia 8 May 1806. He came to the colonies about 1747 and entered at Philadelphia the counting-room of Charles Willing, merchant; in 1754 formed a partnership with Thomas Willing maintained until 1793; acquired a very considerable fortune for America of that time; and despite a strong English loyalty opposed the stamp act and signed the non-importation agreement of 1765. In October 1775 he was elected to the provincial assembly, and in 1776–8 was a member of the Continental Congress. On 2 July 1776 he voted against the Declaration of Independence, and on 4 July absented himself; but on 2 August, he was one of the signers. When hostilities began his services became of increasing value. When Congress fled from Philadelphia to Baltimore on 12 Dec. 1776, Morris was left in charge of its affairs, and when it reassembled at Baltimore on 20 December was made with George Clymer of Pennsylvania and George Walton of Georgia a committee for the execution of Continental business. Morris did all that was done. Most of the business of the colonies during December and January was transacted by him; he prepared American ships for sea, assumed charge of incoming freights, and supplied Washington with money. On 20 Feb. 1781 he was elected superintendent of finance. He found the treasury in a disordered state; presented to Congress a plan for the organization of the Bank of North America, accepted 28 May; and himself subscribed for $39,200 worth of shares. The bank was incorporated 31 Dec. 1781 and began operation 7 Jan. 1782. Morris resigned January 1783, but on request did not retire until 1 Nov. 1784. He was a member of the Pennsylvania assembly in 1776–8, 1778–9, 1780–1, 1785–7. In 1787 he was a member of the convention that framed the United States Constitution. He declined the secretaryship of the treasury, and was United States Senator from Pennsylvania in 1789–95. With James Greenleaf and against Washington's advice, he entered land speculation, purchasing in the new city of Washington 6,000 lots at $80 each, and agreeing to build yearly 20 brick houses. He was compelled to make an assignment, and was imprisoned for debt at Philadelphia from 19 Feb. 1798 to 26 Aug. 1801. The influence of his credit, his ability in raising loans, and his financial skill were of the utmost importance to the struggling cause of the Revolution; and it is generally admitted that he was also a momentous force in Washington's administration. Consult: Sparks, 'Diplomatical Correspondence of the Revolution' (1829–30); the 'Life' by Sumner (1892) in the 'Makers of America' series; and Oberholtzer, 'Robert Morris: Patriot and Financier' (1903).

Morris, Thomas, American statesman: b. Augusta County, Va., 3 Jan. 1776; d. Bethel, Ohio, 7 Dec. 1844. He removed in 1795 to Columbia, Ohio, and was employed by the Rev. John Smith, the first senator from Ohio. He fixed his residence in 1800 in Clermont County, studied law, was admitted to the bar, was a member of the State legislature from 1806 to 1830, was a judge of the State supreme court (1815–21), and in 1832 was elected to the United States Senate, where he distinguished himself as an opponent of slavery, and was engaged in important debates with Calhoun and Clay in defense of the right of petition and of the duty of the general government to discourage slavery. His anti-slavery sentiments rendered him distasteful to the Democratic party, by which he had been elected, and he permanently retired in March 1839. In 1844 he was nominated for vice-president by the Buffalo convention of the Liberty party, on the ticket with J. G. Birney (q.v.) for president.

Morris, William, English poet and artist: b. Walthamstow, Essex, 24 March 1834; d. Hammersmith, London, 3 Oct. 1896. He was educated at Marlborough College and Oxford University, and was for some nine months a pupil in the office of the noted architect, George Edmund Street. In 1856 he founded 'The Oxford and Cambridge Magazine,' to which he contributed often, and which he published at his own expense for the year it was issued. Two years later (1858) appeared 'The Defense of Guinevere and Other Poems,' in the pages of which the temper of the Middle Ages may be said to find its most accurate modern interpretation. In 1867 he published the 'Life and Death of Jason,' an epic of 17 cantos in heroic couplets, which showed him to be a teller of stories *par excellence.* By this time he had definitely entered upon his career of weaver anew of old tales from classic or mediæval sources, and the next year (1868) appeared the first volume of 'The Earthly Paradise,' a series of stories retold from classical and mediæval originals, but with a mediæval setting. A second and third volume followed in 1869 and 1870, the entire work comprising 24 tales with the addition of interludes and preludes and 12 lyrics of the months. In 'The Earthly Paradise,' as in the 'Jason,' Morris took Chaucer for his master as well in the structure of his verse as in what may be termed the processional nature of his descriptive passages. Three verse forms are employed by him, the seven-lined decasyllabic stanza known as the Chaucerian heptastich, the four-foot couplet and the heroic couplet. 'The Earthly Paradise' includes some 40,000 lines, but when once the reader has fallen under the poet's sway his leisurely manner will not be found wearisome. In 'The Lovers of Gudrun,' one of the tales of 'The Earthly Paradise,' Morris had already turned to Iceland for a theme and in 'The Story of Sigurd the Volsung and the Fall of the Niblungs' (1876) he returned to Icelandic myth for his subject. The poet regarded this poem as his masterpiece and in the opinion of not a few critics it ranks as almost the greatest, if not the greatest epic of the 19th century. In his hands the ancient myth becomes alive and throbs with all the intensity of primeval passion. Beside these works Morris published also in verse 'Love is Enough, or the Freeing of Pharamond' (1873); 'The Æneids of Virgil done into English verse' (1875), in which the metre adopted is that of Chapman's Homer; 'The Odyssey of Homer done into English verse' (1887); 'The Dream of John Ball' (1888); and 'Poems by the Way'; (1892). In 1863 Morris began the manufacture of wall paper, stained glass, and artistic furniture, and to his labors in this particular is traceable much of the reform which English and American trade has experienced in household art during the last generation. In 1890 he established the Kelmscott Press at Hammersmith, and there published exquisitely printed editions of Chaucer, Beowulf and other works, as well as of his own writings. Still another side of his nature was shown in the trend of his human sympathies. He had long been known as poet and craftsman, but from 1885 he was active as a social reformer, lecturing frequently to workingmen in halls or in the open air, and helping to support the 'Commonwealth,' a socialist journal. It is not wholly easy to understand this side of his nature, for intensely democratic as he became, in theory at least, he was an equally intense lover of that very beauty which a social upheaval would destroy. The ugliness of much of modern life led him to socialism but he was thoroughly sincere in his attitude, illogical as it may seem to many. However difficult it may be to adjust satisfactorily to our minds the attitude of the poet-socialist with the character of his work as a craftsman, which was offered to the world at prices practically prohibitory for the majority of persons, it is an unquestionable fact that the world is a pleasanter, wholesomer world for his having lived in it. He helped his generation to perceive that there is no necessary alliance between utility and ugliness; he raised the standard of household taste, and as a poet he was one of the most melodious of his time. In his later years he essayed a form of composition in mingled prose and verse greatly enjoyed by many, though perhaps not wholly to the taste of those who liked him best as the author of 'The Earthly Paradise' and 'Sigurd'—a series of romances beginning with 'The Tale of the House of the Wolfings' (1889) and succeeded by 'The Roots of the Mountains' (1890); 'News from Nowhere' (1891); 'The Story of the Glittering Plain' (1891); 'The Wood beyond the World' (1894); 'The Well at the World's End' (1896); 'The Water of the Wondrous Isles' (1897). With Erikir Magnusson, the Icelandic scholar, he published 'The Story of Grettir the Strong' (1869); 'Volsunga Saga' (1870); and 'Three Northern Love Stories and Other Tales' (1875). Still other works by him are 'The Decorative Art' (1878); 'Hopes and Fears for Art' (1882); 'Signs of Change' seven lectures (1888); with Belfast Bax, 'Socialism: its Growth and Outcome' (1893); 'Architecture, Industry and Wealth' (1903). Morris' socialistic theories prevented his receiving the offer of the laureateship on the death of Tennyson, but that he would have accepted it is quite unlikely. He was a devoted admirer of mediæval architecture and his account in the 'Earthly Paradise' of the front of Peterborough cathedral is one of the finest descriptions of an architectural feature to be found in English literature. He wrote the excellent monograph on 'Mural Painting' in the ninth edition of the 'Encyclopædia Britannica.' Consult: Vallance, 'William Morris: his Art, etc.' (1897); Mackail, 'The Life of William Morris' (1899); Cary, 'William Morris, Poet, Craftsman and Socialist' (1902); Riegel, 'Die Quellen von William Morris's Dichtung, «The Earthly Paradise,» in Erlanger Beiträge zur englischen Philologie' (1890).

Morris, William O'Connor, Irish jurist and author. He was educated at Oxford, was admitted to the Irish bar in 1854 and has been a county court judge from 1872. He is the author of 'Great Commanders of Modern Times'; 'Napoleon'; 'Moltke'; 'Irish History'; 'Hannibal'; 'Ireland: 1798–1898'; 'Present Irish Questions'; etc.

Morris, an island at the entrance to Charleston Harbor, S. C., south of the main channel. It is east of James Island, nearly a mile south of Fort Sumter and about a mile and a half from Fort Moultrie. At Cummings Point, on the north end of the island, three small batteries took part in the bombardment of Fort Sumter, 12–13 April 1861. Later Battery Wagner was constructed on the south end of the island and the batteries on the north end were strengthened and called Battery Gregg. Attempts were made, in 1863, by the Union forces under Admiral Du Pont and General Hunter, to secure possession of the island, and later by Admiral Dahlgren and General Gilmore. A landing was made on 10 July and on the 11th and 18th an encounter took place, and a regular siege began. See FORT SUMTER.

Morris, Ill., city, county-seat of Grundy County; on the Illinois River, the Illinois and Michigan Canal, and on the Chicago, R. I. & P. railroad; about 60 miles southwest of Chicago. The first settlement was made in 1834, and in 1857 the town was incorporated. The surrounding country is a fertile agricultural region in which there are large bituminous coalfields. The principal manufactures are brick, tile, paper car-wheels, oatmeal, flour, and leather. The city has considerable trade in coal, live-stock, and grain. It is the seat of Saint Angela's Academy and has good public and parish schools. Pop. (1910) 4,563.

Morris, Minn., village, county-seat of Stevens County; on the Great N. and Northern P. R.R.'s; about 160 miles west by north of Saint Paul. Good water is obtained from the Pomme de Terre River which is near. The chief product of the surrounding agricultural region is wheat. The principal manufactures of the village are flour and dairy products. There are several grain elevators, stock yards, and lumber and brick yards. The village has a good school and a public library. Pop. (1910) 1,685.

Morris Brown College, in Atlanta, Ga.; a coeducational institution founded in 1880 under the auspices of the Methodist Episcopal Church. In 1910 there were in connection with the school 31 professors and instructors, and nearly 783 pupils. There were in the library 2,000 volumes. The grounds and buildings were valued at $125,000 and the income about $20,000.

Morris Dance, or Moorish Dance, supposed to have been derived from the Moriscos in Spain, was formerly danced at puppet-shows, etc. It was introduced into England in the reign of Edward III., when John of Gaunt returned from Spain. In the May-games of Robin Hood, morris-dancers formed an important part. In the reign of Henry VIII. the morris-dancers were dressed in gilt leather and silver paper, and sometimes in coats of white and spangled fustian.

Morris Park. See HORSE-RACING.

Mor'rison, Arthur, English author: b. 1863. He was for a number of years secretary to a charity-trust in London's East End, and there made the studies utilized in his 'Tales of Mean Streets' (1895); and 'The Child of Jago' (1896). He wrote also: 'Martin Hewitt, Investigator' (1896), detective stories; 'The Dorrington Deed-Box' (1897); 'To London Town' (1899); and other volumes.

Morrison, Henry Clay, American Methodist (South) bishop: b. Montgomery County, Tenn., 30 May 1842. He was educated in the public schools and after teaching for several years entered the ministry in 1865. He has held important charges in Louisville, Ky., and Atlanta and was missionary secretary in 1890–8 when he raised $140,000 for the Board of Missions. He was appointed bishop in 1898.

Morrison, James Dow, American Protestant Episcopal bishop: b. Waddington, N. Y., 1844. He was graduated from McGill University, Montreal, in 1865, took orders in the Episcopal ministry and after holding rectorates at Herkimer and Ogdensburg, N. Y., was consecrated first missionary bishop of the diocese of Duluth in 1897. He has published ‘Fundamental Church Principles’ (1899).

Morrison, John Tracy, American lawyer and politician: b. Jefferson County, Pa., 25 Dec. 1860. He was graduated from the University of Wooster, Ohio, in 1887, and from the law department of Cornell University in 1890. In the latter year he moved to Caldwell, Idaho, where he established his law practice. In the campaign of 1896 he was secretary of the Republican State Committee, and in 1896 and 1900 Republican candidate for Congress, but was not elected. From 1897 to 1900 he was chairman of the State committee, and in 1902 was candidate for governor of Idaho, and was elected for a two years' term.

Morrison, Robert, English missionary and Orientalist: b. Morpeth, Northumberland 5 Jan. 1782; d. Canton, China, 1 Aug. 1834. In 1807 he embarked as a missionary for Canton, in 1808 was appointed translator to the East India Company's factory at Canton, and in 1810 began to print the New Testament in Chinese from a text which he had carefully revised. In 1811 he completed a ‘Chinese Grammar,’ published in 1815. In 1814 he completed the New Testament, and with the assistance of Dr. Milne, who had joined him in 1813, the translation of the Old Testament. This was completed in 1818. In 1815 he completed a ‘Chinese Dictionary,’ published in 1821, at the expense of the East India Company. Dr. Morrison and his colleagues superintended very extensive printing operations for the diffusion of tracts and Scripture portions among the Chinese. Besides the works mentioned he wrote ‘Horæ Sinicæ, or Translations from the Popular Literature of the Chinese’ (1812); ‘Dialogues translated from Chinese into English’ (1816); ‘A View of China for Philological Purposes,’ (1817); and several educational works in English and Chinese. Consult his ‘Memoir’ (1839); Townsend, ‘Robert Morrison’ (1888).

Morrison, Theodore Nevin, American Protestant Episcopal bishop; b. Ottawa, Ill., 18 Feb. 1850. He was graduated from Illinois College, Jacksonville, Ill., in 1870, studied for the ministry at the General Theological Seminary, and took priest's orders in the Episcopal Church in 1874. After being rector of St. Paul's Church, Pekin, Ill., 1874–6; and of the Church of the Epiphany in Chicago, 1876–99, he was consecrated bishop of Iowa in February 1899.

Morrison, William Ralls, American lawyer: b. Monroe County, Ill., 14 Sept. 1824; d. 30 Sept. 1909. He was educated at McKendree College, Lebanon, Ill., and served in the Mexican War. In 1852–4 he was clerk of the circuit court of Monroe County and in 1854 was elected to the State legislature; was admitted to the bar in 1855 and he continued in the legislature until 1859, holding the speakership in the latter year. He served in the Civil War 1861–3 receiving the rank of colonel and was member of Congress in 1863–5 and in 1873–87. He introduced the Morrison tariff measure and several other bills and in 1887–97 served as member of the interstate commerce commission of which he was chairman after 1891.

Morrison, Ill., city, county-seat of Whiteside County; on the Chicago and Northwestern railroad; about 120 miles west of Chicago. It is situated in an agricultural and stock-raising region. The industrial establishments are furniture and carriage factories, school furniture and refrigerator factories, flour mills, and creameries. It has considerable trade in dairy products, live-stock, and manufactures. The city has a public library and a museum. Pop. (1910) 2,410.

Morriso'nians. See EVANGELICAL UNION.

Mor'ristown, N. J., city, county-seat of Morris County; on the Delaware, L. & W., the Whippany R., and the Rockaway V. R.R.'s; about 16 miles west of Newark. It is situated in an agricultural region in which market gardening and fruit growing receive considerable attention. It was settled in 1709–10 and was called West Hanover. In 1740 the name was changed to Morristown in honor of Lewis Morris (q.v.) then colonial governor of New Jersey. It was incorporated in 1865. It is about 700 feet above sea-level and overlooks a beautiful section of country. The place figured prominently in the Revolution; in 1777, from January to May, and from December 1779 to June 1780, Morristown was Washington's headquarters. The old Ford mansion, which he occupied, is now owned by the "Washington Association" who preserve here numerous mementoes of Revolutionary and pre-Revolutionary times. It was here that Samuel F. B. Morse (q.v.) and his associate, Alfred Vail, worked on the electric telegraph experiments about 1837. The shaft of the Savannah, the first steamboat to cross the Atlantic, was cast at the old Speedwell Iron Works.

Morristown is largely a residential city; its climate, scenery, and easy access to the cities of New York, Jersey City, and Newark make it a most desirable location for the homes of city business men. It has considerable trade and ships considerable quantities of flowers, fruit, and vegetables. Some of the prominent buildings are the Young Men's Christian Association and the Young Men's Catholic Association buildings, and All Soul's and the Memorial hospitals. There is a beautiful and well-kept park, in which a soldiers' monument has been erected. A monument marks the site of Fort Nonsense, erected by Washington. The city has public and parish schools, and a public library and lyceum. At Morris Plains, about four miles northeast of the city, is a State hospital for the insane, which has accommodation for about 1,500 patients, and which cost about $3,000,000. Pop. (1900) 11,267; (1910) 12,570.

Consult: Tuttle, 'History of Morristown'; Colles, 'Authors and Writers Associated with Morristown' (1893).

Morristown, Tenn., city and county-seat of Hamblen County, about 40 miles northeast of Knoxville; on the Southern and the Morristown & C. R.R.'s. It has manufactures of tobacco, flour, wagons, agricultural implements, stoves, lumber, etc. It is also a large stock-market, and the iron and lead mines and marble quarries in the vicinity add to the importance of its industrial interests. It is the seat of the Morristown Normal College for negroes.

During the Civil War Morristown was the scene of two engagements. On 10 Dec. 1863 Col. Garrard's Union cavalry brigade attacked Gen. W. E. Jones' cavalry brigade in works here, and drove it out of them and from the town. Four days later Col. W. J. Palmer, commanding the Anderson (Pa.) cavalry, had a skirmish near the town with a part of Gen. Martin's cavalry brigade of five regiments, and withdrew leaving Martin in possession of the place. On 28 Oct. 1864 the town was held by Gen. John C. Vaughn's brigade of Confederate cavalry. Vaughn was attacked that day by Gen. A. C. Gillem, with a brigade of Union Tennessee cavalry. Vaughn was falling back to a more favorable position, when Gillem charged his right and centre and stampeded the entire brigade, which fell back in disorder to Russellville. Gillem took 224 prisoners, including 19 officers, four guns and caissons, part of the ammunition train, and about 300 stand of small arms. The Union loss was 8 killed and 18 wounded. Pop. (1910) 4,007.

Morro (mŏr'rō) **Castle,** a former Spanish fort at the entrance to the harbor of Havana, Cuba; also the name of an imposing fortification on the cliffs overlooking Santiago Bay. It was in sight of this fort and under fire of its guns that Lieutenant Hobson and seven men of the United States navy, on 3 June 1898, sank the Merrimac at the entrance to the harbor to prevent the Spanish fleet from escaping. See CUBA; HAVANA; UNITED STATES — SPANISH-AMERICAN WAR.

Morrow, Thomas Vaughan, American eclectic physician: b. Fairview, Ky., 14 April 1804; d. Cincinnati, Ohio, 16 July 1850. Educated at Transylvania University of Lexington, Ky., and graduated in medicine from the Reformed Medical College of the City of New York. He was the pioneer promoter and organizer of medical eclecticism in the West. He established the Reformed Medical College of Ohio at Worthington, Ohio, 1830; the Reformed Medical School of Cincinnati in 1842; the Eclectic Medical Institute at Cincinnati, Ohio, in 1845; was editor of the first eclectic medical journal, and author (with Dr. I. G. Jones) of Jones and Morrow's 'Practice of Medicine' (eclectic). Dr. Morrow was the first president of the National Eclectic Medical Association.

Mors, or **Morsöe,** Denmark, the principal island of the Limfjord in the northwest of Jutland, 23 miles long, 11 miles broad, and with an area of 140 square miles. Capital, Nykjöbing, on the east coast. It reaches a maximum altitude of 250 feet and its shores are marked by precipitous cliffs. Pop. (1901) 22,237.

Morse, môrs, **Edward Sylvester,** American naturalist and Orientalist: b. Portland, Maine, 18 June 1838. He was educated at the Lawrence Scientific School, Harvard University; taught zoology and comparative anatomy at Bowdoin College 1871–4, and at the Imperial University of Tokyo, Japan, 1877–80; and in this way added to his reputation as a zoologist a remarkable intimacy with Chinese and Japanese art, especially ceramics, and with the folklore and early archæology of the two countries. His collection of Japanese pottery is now in the Boston Museum of Fine Arts; it keeps his name and he is its curator. In 1881 Morse became director of the Peabody Academy of Sciences, of which he was one of the founders. He wrote: 'Early Stages of Terebratulina' (1870); 'Embryology of Terebratulina' (1872), and other studies showing the non-molluscous character of the brachiopods; 'First Book in Zoology' (1875, and in German and Japanese versions); 'Early Races of Man in Japan' (1879); 'Japanese Homes and their Surroundings' (1886); and 'Glimpse of China and Chinese Homes' (1902).

Morse, Jedidiah, American Congregationalist clergyman and geographer: b. Woodstock, Conn., 23 Aug. 1761; d. New Haven 9 June 1826. He was graduated from Yale in 1783; studied theology under Jonathan Edwards; was pastor at Charlestown, Mass., from 1789 to 1822; and spent his last years in New Haven. He was intensely orthodox; established in 1805 the 'Panoplist,' a religious journal combating Universalist views; and was an able and successful teacher. He wrote: 'A Compendious History of New England,' with Elijah Harris (1804); 'Annals of the American Revolution' (1824), and a series of excellent biographies.

Morse, John Torrey, American historian: b. Boston 9 Jan. 1840. He was graduated from Harvard in 1860, and was lecturer on history there from 1876 to 1879. For two years he was associated with Henry Cabot Lodge in the editorship of the 'International Review.' He also studied and practised law in Boston for a time. His literary work has been chiefly in historical biography, and he has edited the 'American Statesman' series, which is ranked among the best biographical works for the interpretation of American history. For this series he has written: 'Abraham Lincoln' (1893); 'Benjamin Franklin' (1889); 'John Adams' (1884); 'John Quincy Adams' (1883); and 'Thomas Jefferson' (1883); his other works include: 'Life of Alexander Hamilton' (1876); and 'Life and Letters of Oliver Wendell Holmes' (1896).

Morse, Leopold, American merchant and politician: b. Wachenheim, Bavaria, 15 Aug. 1831. In early life he emigrated to the United States and identified himself with Boston's progress, attaining a high degree of popularity by his public spirit and personal energy. He was elected as a Democrat to the 45th, 46th, 47th, 48th, and 50th Congresses from Massachusetts.

Morse, Samuel Finley Breese, American inventor and artist: b. Charlestown, Mass., 27 April 1791; d. 2 April 1872. He was the eldest son of the Rev. Jedidiah Morse (q.v.). After graduating at Yale in 1810, he visited England with Washington Allston (q.v.) to study painting. In 1813 his first attempt at sculpture, a 'Dying Hercules,' won for him the gold medal of the Adelphi Society, and he received the

Saml. F. B. Morse.

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same from the hands of the Duke of York. He returned to New York in 1815, and in 1824–5 organized an association which became the present National Academy of Design. He was its first president and continued in office for 16 years. He again spent three years in study in Europe, and then returned to New York to take the professorship in the University of the City of New York.

Morse had always been fond of the study of chemistry and natural philosophy, and it became at last a dominant pursuit with him. In consequence of his intimacy with Prof. J. Freeman Dana, who was lecturing in the same institution on the electro-magnet, Morse became interested in electrical matters, and in 1832, while returning home from Havre on the packet ship Sully, he first conceived the idea of the telegraph. But though thus early devised, yet circumstances prevented the complete construction of the first recording apparatus in New York until 1835, when he exhibited it at the New York University building. In 1837 he made another and more perfect exhibition, and filed his caveat at Washington. He now considered his apparatus sufficiently perfected for commercial introduction, and in 1838 he asked Congress to construct an experimental line from Washington to Baltimore to show its practicability. From the skepticism of many and the ridicule of others, Morse's request was not acted upon by Congress, and, disappointed and almost disheartened, he repaired to England in hopes of getting some foreign government to aid him. The result of this visit was a refusal to grant him letters patent in England, and the obtaining of a useless *brevet d'invention* in France. For four years he struggled and put up with many privations, and, as if it were designed to try him up to the last moment, no recognition of the matter was taken till the last night of the Congressional session. He retired to bed disheartened and discouraged before the session was closed. But in the morning — the morning of 4 March 1843 — he was startled with the announcement that the desired aid of Congress had been obtained in the midnight hour of the expiring session, and $30,000 placed at his disposal for his experiment between Washington and Baltimore. In 1844 the work was completed, and demonstrated to the world the practicability and the utility of the Morse system of the electro-magnetic telegraph. The first message, "What hath God wrought?" was sent from the United States Supreme Court room in the Capitol at Washington to Baltimore, 24 May 1844. From that day the telegraph was a success.

Honors were showered upon him by European sovereigns and governments. Probably no American has ever received so many marks of distinction. In 1848 Yale College conferred on him the complimentary degree of LL.D., and in the same year he received the decoration of the *Nishan Iftichar* in diamonds from the sultan of Turkey. Gold medals of scientific merit were awarded him by the king of Prussia (set in a massive gold snuff box), the king of Würtemberg, and the emperor of Austria. From the emperor of the French he received in 1856 the cross of chevalier of the legion of honor; in 1857 from the king of Denmark the cross of knight of the Dannebrog; and in 1858 from the queen of Spain the cross of knight commander of the Order of Isabella the Catholic. The sum of 200,000 francs was presented to him jointly by the principal governments of Europe. It has been said that much of this money was spent in the ceaseless litigation and law suits in which he was involved in the defense of his patent rights.

Prof. Morse also had the distinction of laying the first submarine telegraph line, which was done in New York harbor in 1842. He likewise set up the first daguerreotype apparatus and was associated with John W. Draper in taking the first daguerreotypes in America. A letter from Prof. Morse to the secretary of the treasury in 1843 seems to contain the earliest suggestion of the possibilities of an Atlantic cable. His last public act was the unveiling of the statue of Benjamin Franklin, in Printing House Square, New York. Consult Prime, 'Life of S. F. B. Morse' (1875).

Morse, Sidney Edwards, American journalist and inventor, son of Jedidiah Morse (q.v.), and brother of S. F. B. Morse (q.v.): b. Charlestown, Mass., 7 Feb. 1794; d. New York 24 Dec. 1871. He was graduated at Yale in 1811; studied law; established the 'Boston Recorder' in 1815 and the 'New York Observer' in 1823, the pioneers of American religious journalism; invented a flexible piston-pump in 1817 and the cerographic method of printing maps in 1839; improved a bathometer for deep-sea soundings; and, like his father, was an able and successful geographer. He published several popular atlases and school geographies.

Morse, Sidney H., American sculptor and editor: b. Rochester, N. Y., October 1832; d. San Mateo, Fla., 18 Feb. 1903. In youth he worked at marble-cutting, and acquired a taste for sculpture. Later he studied at Antioch College, and afterward began to preach in Unitarian pulpits in the West; still later made further preparation for the ministry at Harvard, and for some time was settled in Haverhill, Mass. In 1865 he became editor of the 'Radical,' published in Boston as "a medium for the freest expression of thought on all religious and social topics," and conducted it with eminent ability until 1872. The 'Radical' was a worthy successor, after a long interval, of the famous 'Dial' (q.v.), and Morse counted among his friends and contributors Emerson, A. B. Alcott, Samuel Johnson, Samuel Longfellow, and many others prominent in literature and reform, leaders in the progressive movements of the time. A man of genius and of winsome personality, he devoted himself through his magazine, with heroic self-sacrifice, to a task which appreciably furthered the aims of America's foremost thinkers and workers. When he discontinued the 'Radical' he turned with enthusiasm to sculpture, and produced many notable works. He made a bust of Emerson, which is in the Second Church, Boston, the present edifice of the society to which Emerson ministered (1829–32), and another of the same subject, accepted by Emerson's friends as the best extant. His other subjects include Channing, Parker, James Martineau, Walt Whitman, Carlyle, Thomas Paine, Lincoln, Holmes, and many besides. During President Cleveland's first term he gave sittings to Morse for a statuette. In addition to his art work Morse wrote much for periodicals. One of his poems, 'Sundered,' is to be found in Emerson's 'Parnassus,' and a later writer says that if Emerson had known Morse as some knew him «he would have niched him in his gallery of heroes.» Morse was also a welcome lecturer on many platforms, being equally gifted with voice and hand to instruct and entertain.

Morsöe, mŏrs'ē-ē. See MORS.

Mortal'ity, a term applied to that branch of investigation which determines the proportion of the number of persons who die in any assigned period of life or interval of age, out of a given number who enter upon the same interval, and consequently the proportion of those who survive. Tables showing how many out of a certain number of infants, or persons of a given age, will die successively in each year till the whole become extinct, are generally called tables of mortality. There is no fixed number of lives upon which such tables are based, but the observation of a large number is indispensable to accuracy, and the larger the number that can be duly observed the greater will be the degree of accuracy attained. It must always be borne in mind, however, that a strict observation of a moderate number will yield truer results than a looser induction from a larger number. The basis of such calculations must be an accurate register of the number of births and deaths, and in the case of the latter, at what ages, in a given district or extent of country.

In Great Britain the bills of mortality, or abstracts from parish registers, were long the only means of arriving at these results; but being found very imperfect and unsatisfactory, they were supplanted in 1836 by a general registration. The results furnished by such tables are very various, and of great interest. The registers, if kept with sufficient accuracy and minuteness, enable us to determine the proportion of deaths, not only at different ages and in different regions, but at different seasons, in persons of different occupations and habits, in towns, or the country; and thus afford valuable materials for the science of political economy. Although much more attention has been paid to this subject in recent times, yet the observations have not been so extensive nor so accurate as is desirable.

Although the collection of regular statistics of mortality is of recent origin, the subject has always excited much interest, and many general facts have been collected regarding it. The tendency of mortality to diminish with the progress of civilization has been satisfactorily established by statistics. The average rate of mortality is affected by regular or constant causes, such as race, climate, age, sex, profession, social position, density of population, political institutions, habits, etc., and by such irregular or occasional causes as war, famine, pestilence, etc., but notwithstanding the interruption of these occasional causes a constant tendency to a mean has been found to exist in any given state of society. The fact that the tendency of population to increase or diminish is quite independent of the rate of mortality was first established by Malthus, who showed that the increase of population depended on the facility of procuring the means of subsistence and not on the duration of life. The mortality in the United States, for example, is greater than in England, yet the population of the United States doubles itself in 25 years, and that of England in 43 years, while in various European countries which have a lower mortality than the United States, the population will not double in a century.

Some statists have attached considerable importance to the effects of race on population. It is extremely difficult, however, to establish anything in regard to race independently of circumstances and social habits. It has been shown, for example, that the average mortality among the Jews in Prussia is less than among the Christians, that the mortality varies greatly among the various races who inhabit the Austrian Empire, being least among the Germans, and that a similar difference prevails in the departments peopled by various races in France, but all such evidence is open to the most obvious exceptions. The influence of climate on mortality is inseparably associated with that of migration. It cannot be established that any climate, except perhaps the extremes of heat or cold, moisture or dryness, is in itself exceptionally favorable or unfavorable to human life, but change of climate is frequently adverse to it.

The most remarkable fact in respect to age is the great mortality which commonly takes place among children under five years of age. This is especially remarkable in large towns, but is not wholly confined to them. Although the diseases to which infancy is liable may naturally account for part of this excessive mortality, the greater part of it must be attributed to ignorance and want of due care in the training of children, partly arising from the unfavorable circumstances in which, through the too rapid increase of population, they are brought into the world. This is both directly and indirectly a considerable cause of the extra mortality of large towns and other dense centres of population. The question whether city or country life is most conducive to a low rate of mortality is still undecided. Direct statistics prove nothing, as the death-rate of towns is raised by immigration from the country and other causes. In regard to sex it is established that women live longer than men, and that among men the married live longer than the single. The condition of life in respect of poverty or wealth is known to have a considerable influence on mortality. Dividing France into two classes, rich and poor, the annual mortality was found to be 1 in 46 in the former, and 1 in 33 in the latter. This gave to the rich an average duration of life of 57 and to the poor one of 37 years. See LONGEVITY; VITAL STATISTICS.

Mortar, a calcareous cement used in building. It differs in its characteristics according to the nature, proportions, or treatment of its constituents. The proportions vary from 1½ to 4 or 5 of sand to 1 of lime. Hydraulic mortar is made from certain limestones which include in their composition so large a proportion of iron and clay as to enable them to form cements which have the property of hardening under water, and are called hydraulic limestones. The proportions of clay vary in different quarries, and often in the same from 8 to 25 per cent. See CEMENT; LIME.

Mortar, or **Morter,** a vessel of iron, porcelain or stone used by pharmacists and others in preparing powders and other medicines. Also a piece of ordnance. See ORDNANCE.

Mortara, môr-tä'rä, **Edgar,** Jewish boy whose forcible removal from his parents by the orders of the Archbishop of Bologna in 1858 aroused great excitement in Europe. The plea made in justification of the act was that Mortara had been early baptized into Christianity by a Roman Catholic maid-servant. The Roman Catholic authorities, however, declined to return him; and despite the many protests in the matter, he remained, of his own choice, with the Church and entered the Augustinian order.

Morte d'Arthur, môrt där'thėr. See ARTHURIAN LEGENDS.

Morten-Müller, môr'tĕn-mül'lĕr, Norwegian painter: b. Holmestrand, Christianiafiord, 29 Feb. 1828. He began to study art in Düsseldorf (1847) first under Tidemand and Eude, and later as a pupil in the Academy under J. W. Schirmer. He removed to Stockholm in 1850, but in 1866 opened an art school in Christiania under government patronage. He returned to Düsseldorf in 1871 and devoted himself to setting forth the wild scenery of his native country in a series of vast canvases. Fiord, valley, and mountain height are represented with fine imaginative yet truthful line and color. The most noteworthy of his landscapes are: 'Norwegian Landscape' and 'Entrance to Hardangerfiord' (both in the National Gallery of Christiania); 'A Fir Forest' (in the Gallery at Hamburg); 'Romsdalfiord,' with historical figures put in by Tidemand (1876); 'Start of the Fishing-boats by Night'; 'Waterfall and Pine Forest' (1879); 'Fisherman's Cot in Christianiafiord' (1880); 'Woodland Lake by Moonlight' (1892). His works combine romantic picturesqueness with color power of startling realism. In 1874 he was appointed court painter and member of the Stockholm Academy.

Mortgage, môr'gāj, in law, the conveyance of property as security for the payment of a debt on the condition that if the debt be duly paid the conveyance shall be void. The term is applied: (1) To the act of making such a conveyance; (2) to the deed by which such conveyance is made; (3) to the rights thereby conferred on the mortgagee. He who makes the mortgage is the mortgagor; he for whose benefit it is made is the mortgagee. Whatever may be sold may be mortgaged. Mortgages may therefore cover chattels or real estate. Mortgages must be in writing, either in one single instrument containing the whole case, or in two, one containing the conveyance, the other the condition of the conveyance, this last document being the «defeasance.» A deposit of title-deeds, with a verbal agreement, creates an equitable mortgage in some States which recognize this proceeding as a mode of securing a debt. The different States regulate the time in which mortgages are to be recorded, in order to protect innocent purchasers, but an unrecorded mortgage is good as against the mortgagor, or any purchaser knowing of its existence at the time of his purchase. In those States which recognize chattel mortgages (or mortgages of personal property), a record of the same within a specified time is required, to render them valid as against other claimants. See also FORECLOSURE.

Mortgage Banks, were originally planned to furnish credit funds on houses, lands, mines and other property. These mortgage loans are for periods of from 10 to 75 years. Such banks are found in most European countries. Those of France are perhaps best known, among them being the Crédit Foncier. There are no banks of this character in the United States, loans being mostly made through individual bankers or brokers.

Mortifica'tion. See GANGRENE.

Mortimer, môr'tĭ-mėr, **John Hamilton,** English artist: b. Eastbourne, Lusset, 1741; d. 1779. After studying under Sir Joshua Reynolds he carried off the first prize of the Society of Arts, London (1763). He was elected R. A. in 1779. A bold and vigorous draughtsman, and a good colorist, he was fond of dramatic scenes in which there was an element of the terrible. His style and manner are well exemplified in the pictures 'Battle of Agincourt'; 'Voltigern and Rowena'; 'Hercules Slaying the Hydra'; now in the South Kensington Museum. He was very successful as an etcher and designed stained glass for Salisbury Cathedral and Brazenose College, Oxford.

Mortimer, Roger, Baron of Wigmore, earl of March; English noble: b. about 1287; d. Smithfield, 29 Nov. 1330. He had been convicted of treason in the reign of Edward II. and pardoned; but notwithstanding the king's clemency took part in the rebellion of the earl of Lancaster, and was made prisoner in 1322. Having escaped from the Tower, where he was confined, he went to France and at Paris in 1325 met Queen Isabella, who had been sent thither by Edward to negotiate a treaty. Fascinated by his pleasing address, the queen was soon known to be living in guilty intimacy with the exile, and, having secured the person of her young son, began to mature plans with Mortimer and the other leaders of the barons for getting possession of the kingdom. Mortimer went with her to England in 1326; the king was deposed, and his son Edward III. proclaimed in his stead, and for some years Isabella and her paramour governed the realm in the name of the young prince. Mortimer procured the death of the dethroned monarch in his prison, but he was denounced from the pulpit; the nobles wearied of his arrogance, and Edward resolved to take the sceptre into his own hands. While the queen and Mortimer were in Nottingham castle during the session of parliament at that town, the king and Lord Montacute with attendants entered by night through a subterranean passage, and carried off the earl. The king summoned a new parliament to meet him at Westminster, and on 26 Nov. Mortimer was condemned by this parliament and executed three days later.

Mortmain, môrt'măn, in English law, lands held by a corporation were said to be held in mortmain (*mortua manu,* by dead hand), because they were then not alienable. The expression has particular reference to estates held by religious and eleemosynary corporations in England. The law on this subject was consolidated by the Mortmain and

Charitable Uses Act (1888), under which no bequest for a charitable purpose was to involve the acquisition of land. The act of 1891 enacted that land may be devoted to any charitable use, but it must be sold within a year from the testator's death, unless the time be extended by certain authorities. It also permits the acquirement of land directed to be acquired for a charity if the court or the charity commissioners consent. A large number of acts from 1841 onward have exempted from mortmain restrictions land bequeathed for school sites, burial-places, places of worship, literary and scientific institutions, public parks, but maximum limits are imposed in several cases.

Mor'ton, or **Mourt, George,** Puritan colonist: b. York, England, about 1585; d. 1628 (?). He affiliated himself with the Puritans in 1600 and settled in Holland, but was for some years previous to 1820 London agent for the Puritans. Authorities disagree as to his career, some placing his emigration to America in 1620 while others fix it at 1623, and the same uncertainty prevails as to his death, the dates varying from 1624 to 1628, and there is no conclusive evidence as to whether it occurred in England or America. For many years he was credited with the authorship of Mourt's 'Relation or Journall of the beginning and proceedings of the English Plantation at Plimoth,' published in London in 1622. Careful investigation, however, seems to prove conclusively that the authorship must be credited to Winslow and Bradford and that at most only a small portion of it can be claimed by Morton. The work which is regarded as the most authentic history of the times in existence has been several times reprinted. Consult: 'Mourt's Relation,' with introduction and notes by Henry Martyn Dexter.

Morton, Henry, American scientist: b. New York 11 Dec. 1836; d. there 9 May 1902. He was graduated from the University of Pennsylvania in 1857 and after taking a post-graduate course in chemistry turned his attention to law, but finding scientific work more to his liking he abandoned law to become professor of physics and chemistry at the Episcopal Academy of Philadelphia in 1860. His lectures in 1863 at the Franklin Institute in Philadelphia attracted attention throughout the United States and Europe by reason of his brilliant and unique experiments. He was one of the founders of the Philadelphia Dental College in 1863, and its first professor of chemistry and in 1864–70 was resident secretary at Franklin Institute where he continued his lectures. In 1867 he was appointed professor of chemistry at the University of Pennsylvania and in the same year became editor of the Franklin Institute 'Journal.' He conducted the photographic branch of the United States eclipse expedition to Iowa in 1869, and in addition to securing several excellent photographs of the eclipse proved that the bright line on the sun's disk adjacent to the moon is due to a chemical action in the process of developing the plate and not to diffraction as had hitherto been held by the best scientists. In 1870 he was chosen president of the newly founded Stevens Institute of Technology and under his direction the faculty was selected and the course of instruction formed. His management of the institute made it one of the leading technological schools of the country; he gave it the benefit not only of his great learning but also several munificent gifts in the establishment and endowment of various necessary departments. His reputation as a scientist became world-wide and his services as a chemical expert were eagerly sought in court. In 1878 he was appointed to the United States Lighthouse Board and in 1876–81 he was president of the American Chemical Society. Besides articles contributed to encyclopædias he wrote numerous papers on electricity and fluorescence and assisted in the preparation of 'The Student's Practical Chemistry' (1868).

Morton, James Douglas, 4TH EARL OF, regent of Scotland: b. Dalkeith, Scotland, about 1530; d. Edinburgh 3 June 1581. He married a daughter of the third earl and succeeded to the earldom on the death of his father-in-law, in 1553. He became Lord High-Chancellor of Scotland ten years later, but fled to England in 1556 on account of his share in the murder of Rizzio. He was soon pardoned and was one of the leading opponents of Bothwell; was again made chancellor, and in 1572 regent of the kingdom. Having made himself many enemies by maladministration, he resigned, but recovered authority not long after. His enemies, however, at length proving too strong for him, he was charged as accessory to the murder of Darnley, tried, condemned, and beheaded by the decapitating instrument he himself had introduced into Scotland.

Morton, James St. Clair, American soldier: b. Philadelphia, Pa., 24 Sept. 1829; d. Petersburg, Va., 17 June 1864. He was graduated from West Point in 1851, was appointed to the engineering corps, and in 1855–7 was assistant professor of engineering there. He was in charge of the Chiriqui expedition in Central America in 1860 and later superintended the work on the Washington aqueduct. In 1861 he was in command of the fortification at Tortugas and in May 1862 was appointed chief engineer of the Army of the Ohio. In October 1862 he was promoted brigadier-general and was transferred to the Army of the Cumberland as chief engineer in command of the bridge-brigade. He built the intrenchments around Murfreesborough, Tenn., and was engaged in the battles at Chattanooga and Chickamauga. He was chief engineer of the Ninth army corps in the Richmond campaign of 1864 and was killed in the battle of Petersburg. He published: 'An Essay on Instruction in Engineering' (1856); 'Memoir on Fortification' (1858); 'Life of Maj. John Saunders, of the Engineers' (1860); etc.

Morton, John, English prelate: b. Milborne, St. Andrew, Dorsetshire, England, about 1420; d. Knoll, Kent, 15 Sept. 1500. He studied at Balliol College, Oxford, and subsequently became principal of what is now Christ Church College. He adhered with great fidelity to Henry VI., but nevertheless Edward IV. made him Master of the Rolls and Bishop of Ely (1478). Richard III. imprisoned him, but he escaped to Flanders and under Henry VIII. became Archbishop of Canterbury and chancellor (1486). In 1493 he became a cardinal.

Morton, John, one of the signers of the Declaration of Independence: b. Ridley, Delaware County, Pa., 1724; d. 1777. After working for several years as a surveyor, he began the practice of law. In 1764 he was elected to the general assembly of Pennsylvania, of which he became a conspicuous member, serving for a number of years and being speaker from 1772 to 1775. In 1765 he was a member of the Stamp Act congress; in 1766 became sheriff in his county, and was shortly afterward appointed one of the judges of the supreme court of Pennsylvania. He was always an earnest advocate of the rights of the colonies and warmly supported the Revolutionary War. In 1774 he was elected a delegate to the 1st Continental Congress, and was a member of that body till his death, taking active part in its debates and in the framing of the Articles of Confederation. He gave the casting vote of Pennsylvania in favor of the Declaration of Independence, the four other delegates present from that State being equally divided as to the measure; and affixed his signature to the Declaration.

Morton, Julius Sterling, American agriculturist: b. Adams, N. Y., 22 April 1832; d. Lake Forest, Ill., 27 April 1902. He was graduated from Union College in 1854 and removed to Nebraska City in 1855 where he was editor of the Nebraska City *News*. In 1856–7 he was a member of the territorial legislature and in 1858 secretary of the territory. Upon the resignation of Governor Richardson in 1858 he acted as governor and in 1893–7 was secretary of agriculture under President Cleveland. He was the originator of Arbor Day and an active member of various agricultural and horticultural societies.

Morton, Levi Parsons, American banker and politician: b. Shoreham, Vt., 16 May 1824. He received an academic education, and in 1843 established a mercantile business at Hanover, N. H.; in 1850 entered the banking business in Boston; and later removed to New York, where in 1863 he founded the large banking firm of Levi P. Morton & Company (later Morton, Bliss & Company), which assisted in floating the government war loan during the Civil War. He has also established a branch of his firm in London, and the Morton Trust Company of New York, and has gained a reputation as an able financier. He was elected to Congress on the Republican ticket in 1878 and served one term (till 1881); he was then appointed United States minister to France, where he remained till 1885; in this capacity he secured legal status in France for American corporations. In 1888 he was elected Vice-President of the United States, and made an especially able presiding officer in the Senate. In 1894 he was elected governor of New York State, serving for one term; in the last year of administration he urged in a special message the abolition of the ward-trustee system of school government in New York city public schools, and signed the bill which enforced this reform. In 1896 he was New York State's candidate for the Presidency at the National Republican Convention.

Morton, Marcus, American politician: b. Taunton, Mass., 8 April 1819; d. Andover, Mass., 10 Feb. 1891. He was graduated from Brown University in 1838 and studied law at Harvard receiving admission to the bar in 1841. He practised law in Boston until 1850 when he established a permanent practice in Andover. He was elected to the Massachusetts House of Representatives in 1858 and was appointed to the superior court of Suffolk County in that year and in 1859 became justice of the superior court of the State. In 1869 he was appointed associate judge of the supreme court of the State and in 1882 became chief justice, resigning in 1890.

Morton, Nathaniel, American historian: b. Leyden, Holland, about 1613; d. Plymouth, Mass., 29 June 1685. He was of English descent, came with his father to Plymouth in 1623, became an inmate of Governor Bradford's family and his public assistant, and from 1645 until his death was secretary of the colony. In compliance with the request of the commissioners of the New England colonies, he compiled (1669) and published his principal work, 'New England's Memorial, or a Brief Relation of the Most Remarkable and Memorable Passages of the Providence of God Manifested to the Planters of New England.' For nearly two centuries, or until Bradford's 'History of Plymouth' was discovered in 1855, Morton's work was the principal authority on the matters it dealt with. He compiled it largely from Bradford's manuscripts and Edward Winslow's journals. 'New England's Memorial' was several times reprinted in the American colonies, and was also reproduced in England. Besides various other works, Morton was also the author of 'A Synopsis of the Church History of Plymouth' (1680).

Morton, Oliver Perry, American statesman: b. Salisbury, Wayne County, Ind., 4 Aug. 1823; d. Indianapolis 1 Nov. 1877. He studied law, was admitted to the bar in 184[illegible], and began the practice of his profession in Centreville, Ind. He had been a Democrat, but became one of the leaders of the new Republican party and was defeated as its candidate for governor in 1856. Four years subsequently he was elected lieutenant governor and when in January, 1861, Governor Lane was elected to the National Senate, Morton became governor. His active loyalty to the government did much to sustain the administration during the trying times of the Civil War. At its outbreak he at once sent troops to the field, but in the next year was greatly hindered in his efforts by a hostile legislature and subsequently by the efforts of a secret, disloyal society known as the Knights of the Golden Circle. Nevertheless he surmounted all obstacles and his services to the nation were thankfully recognized by its chiefs. He was elected a United States Senator from Indiana as a Republican in 1867, serving till 1877, and in the latter year was a member of the Electoral Commission. Consult 'Life,' by Foulke (1899).

Morton, Samuel George, American anatomist: b. Philadelphia, Pa., 26 Jan. 1799; d. there 15 May 1851. He studied medicine at the University of Pennsylvania and in Edinburgh; began to practise in Philadelphia in 1824; was immediately prominent in the Academy of Natural Sciences, being its secretary 1825 and its president 1850; became professor of anatomy in Pennsylvania College in 1839; and made special studies of ethnology, craniology and plant physiology. His valuable collection of skulls, numbering 1,500 specimens, 900 human, led him to urge the diverse origin of the human race. He contributed to Silliman's 'Journal,' and published 'Crania Americana' (1839); 'Crania Egyptica' (1844); and 'Illustrated System of Human Anatomy' (1849).

Morton, Thomas, English colonist in America: b. England about 1575; d. Agamenticus (or Acomenticus), Maine, 1646. He was an attorney of Clifford's Inn, London, and seems to have practised mainly in western England. In 1622 he landed in New England, where he remained three months; and in 1625 returned with Wollaston's company. Wollaston soon after left for Virginia, and in the summer of 1626 Morton assumed control over those of Wollaston's following that remained. The settlement, Mount Wollaston (now Braintree, Mass.), near the coast, he called Mare Mount (Merry Mount); and in the spring of 1627 he erected a May-pole, and with the «salvages» proceeded to hold May-day to the scandalizing of their Puritan neighbors of Plymouth. Contrary to law, he supplied the Indians with firearms and instructed them in their use; and he was a rival of the Plymouth settlers in the fur-trade. He was accordingly arrested by Captain Miles Standish, and sent back to England (1628). But in August 1629 he was again in New England. In August or September 1630 he was a second time arrested and banished. He published in 1637, 'New English Canaan,' which Nathaniel Morton ('New England's Memorial') denounces as «full of lies and slanders, and full fraught with profane calumnies,» but which as a satire is sometimes not unamusing, and contains information of interest regarding local features and the Indians. When he ventured back to New England he was imprisoned for about a year while evidence for a libel suit was being collected, and was finally let go on payment of a fine of $500. Nathaniel Hawthorne's 'The Maypole of Merry Mount' (in 'Twice-Told Tales,' 1837) and J. L. Motley's 'Merry Mount' (1849) are based on Morton's career.

Morton, William James, American physician: b. Boston 1845. He is a son of W. T. G. Morton (q.v.), whose name is connected with the first anæsthetic use of ether. He was educated at the Boston Latin School; graduated at Harvard in 1867; and a year later entered the Harvard Medical School. On his graduation there, in 1872, he presented a thesis on «Anæsthetics,» which gained him the Boylston prize. For a time he did hospital work; practised medicine at Bar Harbor, Maine, and in Boston; studied in Vienna, 1873-4; went to Kimberley, South Africa, where, besides practising his profession, he engaged in diamond-mining. Settling in New York finally, he became editor of the 'Journal of Nervous and Mental Diseases'; from 1882-5 was adjunct professor of nervous diseases at the New York Post-Graduate Medical School; served as neurologist to the New York Infant Asylum, 1887-90; and since then has been professor of nervous diseases and electrotherapeutics at the New York Post-Graduate School. As an authority in electrotherapeutics he has won wide recognition, and by his mechanical device for establishing the «static induced current» of electricity — the «Morton current» of the scientific world — has supplied a means for producing the X-ray, and rendered a service of great practical value to medicine and surgery. His contributions to medical literature are numerous. He has been president of the New York Neurological Society, of the New York Electrotherapeutic Society, and of the American Electrotherapeutic Association, and is a member of many American and foreign scientific bodies.

Morton, William Thomas Green, American dental surgeon: b. Charlton, Mass., 19 Aug. 1819; d. New York 15 July 1868. He established himself in the practice of dentistry in Boston, and there in March 1844 became a student of medicine in the office of Dr. C. T. Jackson (q.v.), the scientist. In November 1846 he obtained a patent for the process of anæsthesia by what he called «letheon,» now known as ether. Jackson claimed the discovery of etherization previous to the winter of 1841-2, and Morton's patent was contested by both Jackson and Horace Wells, another of Jackson's pupils. Morton communicated his knowledge of the process to Dr. J. C. Warren, and anæsthesia by ether was made public through an operation performed by Warren at the Massachusetts General Hospital 16 Oct. 1846. The French Academy of Sciences investigated the matter and decreed a Montyon prize of 2,500 francs to Jackson for the discovery, and another of like amount to Morton for the application of the discovery to surgical operations. In 1852 a bill appropriating $100,000 as a national testimonial to Morton was introduced in Congress, but failed, as it did also in 1853 and 1854. Testimonials accrediting to him the application of ether as an anæsthetic were signed by the medical profession in Boston (1856), New York (1858), and Philadelphia (1860). Consult Weyman, 'Trials of a Public Benefactor' (1859).

Mor'tuary Customs. See Burial; Dead, Disposal of.

Morwitz, môr'vĭts, **Edward,** German-American journalist: b. Dantzic, Prussia, 11 June 1815; d. Philadelphia 13 Dec. 1893. After thorough training in the sciences and medicine at various German universities, he was graduated in 1840 from Berlin University, where he became an assistant physician and wrote 'The History of Medicine' (1848-9). In 1843 he practised his profession at Conitz, Prussia, but after the revolution of 1848, settled in the United States. In 1853 he bought the German 'Democrat' of Philadelphia and in 1855 issued a German political German weekly, 'The United States Journal,' followed in the same year by a German Sunday paper, 'The New World.' In 1862 he took a leading part in establishing the German Press Association of Pennsylvania, and in 1870 organized the movement to raise funds for aiding German soldiers in the Franco-German war, about $600,000 being received for that purpose. He at one time controlled a large number of newspapers, both German and English, and was a powerful factor in welding together the German population of the State. He invented a breech-loading gun before leaving Germany.

Mosa'ic, an imitation or reproduction of a painting or ornamental design, formed generally by means of pieces of opaque glass of different colors; also by colored stones (especially marbles and precious stones) placed side by side, and attached by being bedded in a cement. The art originated in the East, but received its perfection from the Greeks, and was thus conveyed to the Romans. In Italy many floors ornamented with mosaic work have been found among ancient ruins. Afterward, when the art was revived in Italy, the Venetian school becoming very celebrated, Clement VIII., in the 17th century, had the interior of the dome of Saint Peter's decorated with this kind of work. The art was largely employed for copying paintings by famous artists, and thus rendering permanent their original freshness and beauty. The Roman school of mosaicists is still the most famous, though excellent works have been produced in recent times by Venetian and also by Russian artists. There is a studio for the production of mosaics in the Vatican at Rome. The most important works executed here in recent times are a series of portraits of the popes. In the most costly mosaics precious stones have been cut to furnish materials; but in common works of this art enamels of different colors, manufactured for the purpose, are the material employed. Roman enamels are made of small rods of opaque colored glass. In the first place cakes of glass are made of every variety of color and shade likely to be required. As many as 10,000 shades are said to be in use. These cakes are drawn out into rods thicker or thinner, according as they are to be used for finer or for coarser work, a great number being mere threads. They are kept in bundles, and arranged in sets corresponding to their colors. For a work of moderate size a piece of dark slate or marble is prepared by being hollowed out like a box and filled with plaster of Paris; upon this plaster the artist draws the design or pattern, and the workman proceeds with his work by removing small squares of the plaster, and filling in these with pieces cut from the glass rods, the pieces being fixed in their places by a cement. Gradually, in this manner, all the plaster is removed, and a picture is formed by the ends of the pieces of colored glass. It will easily be understood that this is a very slow process, and there are large pictures that have taken as many as from 12 to 20 years to produce. When mosaic pictures are to be viewed near at hand they are polished perfectly smooth with a flat stone and emery, and present a glossy surface similar to that of paintings in oil. When they are to be viewed at a distance the surface is left rough, when they present an appearance similar to pictures in fresco. Inlaid works, of agate and other costly stones, are executed on the same principle as mosaic, except that the stones are larger, and cut to the shape of different parts of the object to be represented. Works of this class are known as Florentine mosaics. Flowers and ornamental designs are the chief objects of this branch of the art. A mode has been invented of sawing the plate with the mosaic pictures into two or three sheets, and thus increasing the number of works produced at one time.

Mosandrium, or Mosandrum (from K. G. Mosander, a Swedish chemist), a supposed metallic element, whose oxid was thought to have been discovered in 1878 by J. L. Smith, in specimens of the mineral samarskite obtained from North Carolina. It is not now recognized as an element, being in all probability a mixture of terbium and other metals of the cerium group.

Mo'sasaurs, a group or family (*Mosasauri; Mosasauridæ*) of marine reptiles of the Upper Cretaceous Period, typical of the reptilian subclass *Pythonomorpha*. They were of world-wide distribution and their remains occur so plentifully in the western United States as well as in the Old World that their structure is thoroughly known. They were large predaceous marine lizards, resembling the modern monitors in many features, but reaching in many species the size of crocodiles — larger in some cases, but no skeletons are known indicating a greater length than 45 feet. They had four limbs with all the bones well developed but enclosed in a mitten of flesh and skin, forming paddles, which, with their great tails must have made them powerful and agile swimmers. "Their cup-and-ball vertebræ indicate great flexibility of the body, their sharp teeth denote ability to capture slippery prey, and the structure of the lower jaw shows that they probably ate in a hurry and swallowed their food entire. . . . In the Mosasaurs, as in the cormorants, among birds, there is a sort of joint in each half of the lower jaw, which permits it to bow outward when open; . . . if the reader will extend his arms at full length, the palms touching, and then bend his elbows outward, he will get a very good idea of the action of a mosasaur's jaw" — Lucas. The mosasaurs were of three types, namely, *Tylosaurinæ*, resembling gavials, with a long slender beak or extension of the snout beyond the teeth, and long paddles strengthened with numerous phalanges; *Platecarpinæ*, short-headed, very long-tailed reptiles, including *Platecarpus*, *Prognathosaurus*, *Brachysaurus* and some other genera; and *Mosasaurinæ*. The last were the typical mosasaurs, apparently the most completely marine and powerful and perfected of the race. The two genera are *Mosasaurus* and *Clidastes*. None survived the close of the Cretaceous. Consult Zittell-Eastman, 'Text-book of Paleontology' (1902), in which will be found detailed and illustrated descriptions of various forms, and many references to the literature of the subject.

Mosaylima, mō-sä-lē'mä, or **Moseilema**, Arab prophet and rival of Mohammed (q.v.): b. early in the latter half of the 6th century; d. 633. He seems to have been a prophet in the tribe of Bani Hanifah, in Nejd, before Mohammed arose; and his name Rahmân, "the merciful," one of Mohammed's favorite titles for Allah, may be held proof that he claimed to be the Messiah. Tradition says that Mohammed scornfully refused Mosaylima's suggestion that they should share the spiritual leadership of the earth; but modern criticism makes it more probable that the Prophet compromised with him considerably, and it is even suggested that Mohammed wished to make him his successor by testament, but was prevented by his attendants as he was dying. A break between Abu Bekr and Mosaylima came speedily; perhaps Mosaylima even openly opposed Islam. At any rate in the 11th year of the Hegira, his forces though far superior in numbers were met and defeated by Khaled, the Sword of God.

Mosby, mŏz'bĭ, **John Singleton**, American lawyer and soldier: b. Edgemont, Powhatan County, Va., 6 Dec. 1833. He was graduated at the University of Virginia (1852), admitted to the bar (1855), and was practising law at Bristol, Va., when the Civil War broke out. He enlisted as private in the Confederate Army and was later promoted adjutant of the 1st Virginia Cavalry. In two months' time, however, he was reduced to the ranks. Mosby, undaunted, then offered his services as scout to Gen. James E. B. Stuart, and in that capacity guided Stuart's cavalry in a desperate raid on McClellan's army on the Chickahominy in June 1862. In 1863, after enduring a short captivity, he went to Richmond and recruited an independent body of fighters which soon became famous under the name of Mosby's Partisan Rangers. This small cavalry command, of which he was colonel, became a terror to the Union troops and did much damage in cutting off means of communication and destroying supply trains, capturing outposts, etc. They adopted a guerrilla style of warfare and operated through Virginia and Maryland. Subsequently his force was pressed into the regular Confederate army as the 43d battalion of Virginia cavalry, and served till the cessation of hostilities. His men were dispersed and concealed when not engaged in raiding, and he had in force a perfect system of reassembling them at the shortest notice. At Chantilly 16 March 1863 he defeated a much larger force than his own. Probably his most brilliant exploit was the capture of Brig.-Gen. Stoughton, U. S. A., at Fairfax Courthouse, in the same month. To accomplish this he made a raid inside the Federal lines. At Danesville 1 April 1863 he successfully defended himself against a force sent especially to capture him. He harassed the rear of Grant's army, in its advance on Fredericksburg, to such an extent that Grant was forced to send a special detail to protect his communications and supplies. One of Mosby's most important raids resulted in the capture of Sheridan's entire supply train which he surprised near Berryville.

Mosby was commissioned captain in March 1863, major two weeks later and colonel some time after that. His regiment was disbanded 21 April 1865, and he again took up the practice of law, settling at Warrenton Va.

Mosby became a Republican after the War and supported Gen. Grant for the presidency. It is said he originated the phrase "the solid South." He was United States Consul to Hong Kong 1878–85, and afterward practised law in San Francisco, Cal. He delivered a lecture in Boston, on Stuart's Cavalry, in December 1886, which was afterward published in book form and entitled 'War Reminiscences' (1887). He also wrote 'The Dawn of the Real South' (1901). Consult: Crawford, 'Mosby and His Men' (1867); Williamson, 'Mosby's Rangers' (1896).

Moscheles, mŏsh'ĕ-lĕs, **Felix,** English artist, son of the composer, Ignaz Moscheles (q.v.): b. London 8 Feb. 1833. He was educated in London and Leipsic; studied painting under van Lerius in Antwerp, and in Paris and New York; exhibited at Antwerp, in the Paris Salon, and at various London galleries; is best known for his portraits of famous people, as those of Mazzini, Gounod, Rubinstein, Robert Browning, and H. M. Stanley; and has also done much genre painting, examples being 'A Spanish Song,' 'Herodias' Daughter,' and 'Little Mozart's Choir.' He edited (1888) 'Felix Mendelssohn's Letters to Ignaz and Charlotte Moscheles' (Mendelssohn was his god-father); and wrote 'In Bohemia with DuMaurier' (1897), and 'Fragments of an Autobiography' (1902).

Moscheles, Ignaz, German pianist and composer: b. Prague 30 May 1794; d. Leipsic 10 March 1870. He studied under J. D. Weber, director of the Prague Conservatory of Music, and afterward under that of Albrechtsberger and Salieri, at Vienna. On the completion of his studies he made a successful professional tour in Germany, and in 1820 arrived at Paris, where he met with an exceptionally enthusiastic reception. In 1821 he went to London where he was professor of music at the Royal Academy for 25 years. Here he had Thalberg for a pupil, as he had formerly, in Berlin, had Mendelssohn. At the latter's request he went from London to Leipsic where he was professor of music in the conservatory there from 1846 till his death. Among his finest compositions may be mentioned his Concertos Nos. 3, 4, and 5, the Concertos Fantastique and Pathétique; his great Sextett and Trio; his Sonatas Caractéristique and Mélancolique; and his studies. Consult: 'Aus Moscheles Leben' (1872); 'Briefwechsel mit Mendelssohn-Bartholdy' (1888).

Moschus, mŏs'kŭs, Greek bucolic poet of Syracuse: flourished about 150 B.C. Four idyls form the whole of the remains of Moschus, which exhibit great elegance of style and delicacy of conception. The **'Επιτάφιος Βίωνος** ('Lament for Bion') was imitated by Shelley in 'Adonais.' The works of Moschus have commonly been edited with those of Bion (q.v.) and Theocritus (q.v.), and the three have been well translated by Andrew Lang (1880).

Moscoso de Alvarado, Luis, loo-ēs' mōs-kō'sō dā äl-vä-rä'dō, Spanish adventurer: b. Badajoz, Spain, about 1505; d. Peru about 1560. He served under his kinsman Pedro de Alvarado in his expedition to Guatemala in 1529 and in 1534 accompanied him to Peru where he was for two years a follower of Pizarro, and then returned to Spain to live in luxury for several years on the proceeds of his services. In 1538 he attached himself to De Soto's expedition to Florida and upon the latter's death in 1542 took command and after many hardships succeeded in returning to Mexico. He was honored by the viceroy Mendoza and in 1551 accompanied him to Peru where he was entrusted with important commands until his death.

Mos'cow, Idaho, town, county-seat of Latah County; on the Union Pacific and Northern Pacific R.R.'s; about 70 miles, in direct line, southeast of Spokane, Wash. The chief industries of the country around Moscow are lumbering, farming, stock-raising, mining, and fruit-growing. Considerable grain and vegetables are raised. The chief manufactures of the town are lumber, flour, and machine-shop products. The University of Idaho and the State Agricultural College are located in Moscow. Pop. (1910) 3,670.

Moscow, Russia, the second capital of the empire, and until Peter the Great selected Saint Petersburg as a northern capital, the sole capital and imperial residence, situated in a highly cultivated district on the Moskva, 400 miles direct by rail southeast of Saint Petersburg. It is the capital of a government of the same name and is specially esteemed by the Russians as the place of the coronation of the czars, the favorite residence of many of the nobility, the commercial emporium of central Russia and western Asia, and a principal seat of Russian manufactures. It is the holy or white mother city in the creed of the people, and no czar would omit visiting it at least twice a year, or presenting in the city his eldest son after he has reached his majority

As a general rule the temperature ranges from a winter mean of 14° F. to a summer mean of 66°, the annual mean being 40°. Moscow is surrounded by a wall or earthern rampart, 26 miles in circuit, of irregular shape, and altogether useless for any purpose of defense. A considerable portion of the enclosed space is unoccupied by buildings, has an undulating surface, and is traversed by the navigable Moskva, which, entering at the middle of the west wall, makes a series of serpentine windings, in the course of which it receives the Iaousa and the Neglina, and leaves the city at the southeast corner. The general view of the town, as seen from Sparrow Hill, an eminence on the southeast, is peculiarly striking and picturesque. Its hundreds of churches and convents, surmounted by gilt and variously colored domes and spires, its imperial and other palaces, its boulevards, gardens, ponds, and, above all, the high walls and numerous stately towers of the Kremlin or citadel, produce an effect unequaled by any other European city. It formerly comprised five principal divisions: the Kremlin, Kitaigorod, Byeloigorod, Semlyanoigorod, and the Sloboden or suburbs, each part being separated from the other by walls, of which now only those of the first two mentioned districts remain.

Public Buildings, etc.—The Kremlin, situated on the north bank of the river, forms the centre of the town, and in it are found the principal civil and ecclesiastical buildings. Here in the first place is to be seen the Great Palace, a lofty building in a mixed style of architecture, erected in 1838–49, having the Treasury, forming a sort of wing, on the right, while also connected with it is the Terem or old palace of the czars, belonging to the 16th and 17th centuries. The Cathedral Square, on the summit of the Kremlin, contains the Uspenskiy Cathedral (Cathedral of the Assumption), in which the emperors are crowned, built in 1475–9, a clumsy building with heavy pillars, which support five cupolas, these, like the walls, glittering with grotesque frescoes of sacred subjects, painted on a golden ground; another cathedral here is the Archangelskiy Cathedral (of the Archangel Michael), founded in 1333 and rebuilt in 1505–9, containing the tombs of many czars down to Peter the Great; a third is the Blagovieshchenski Cathedral (of the Annunciation), founded in 1397. The arsenal is an immense building lining one side of the northern angle of the Kremlin, the opposite side being occupied by the senate. The chief attraction is the upper story of the treasury, containing the crowns of the early czars, several thrones, warlike trophies, and miscellaneous curiosities; the arsenal contains an immense quantity of weapons and arms, the cannon taken from the French during their retreat, and numerous other military trophies. Near the centre of the buildings of the Kremlin is the tower of Ivan the Great, which rises to the height of 300 feet, contains numerous bells, and is surmounted by a gilded dome, on which the cross is displayed above the crescent. The great Czar Kolokol, or king of bells, the largest in the world, stands at the bottom of the tower on a granite pedestal, to which it was raised in 1832, after having remained for more than a century buried on the spot where it had fallen while an attempt was being made to hoist it. The Kremlin also contains a bronze statue of Alexander II. (1898). Outside of it the chief buildings are the cathedral of St. Vassili (St. Basil), one of the strangest specimens of architecture anywhere to be met with, having no less than 20 gilded and painted domes and towers, all of different shapes and sizes; and the Temple of the Savior, built to commemorate the French retreat, at a cost of $10,000,000. Other buildings worthy of notice are the great riding school, the Gostinnoi Dvor or principal bazaar in the Kitaigorod, a colossal building of three stories, where the leading wholesale merchants carry on their business; the Riadi, in the same quarter, now occupied by handsome new shops. Among the principal educational establishments is the imperial university, founded in 1755 by the Empress Elisabeth; it consists of four faculties, is attended by over 4,000 students, and has a library of about 220,000 volumes, an observatory, and botanic garden; there are many gymnasia of various kinds and grades; technological, agricultural, oriental, commercial, military, and other schools. There are several good museums, the largest and most important being the Rumiantzof, in a fine building, with library and reading-room. The foundling hospital, in which children are received without questions being asked, supports about 5,000 children within its walls, besides large numbers outside. The number of the open and planted spaces throughout the city is great, but otherwise the streets are narrow, uneven, and crooked, lined by mean-looking brick and wood houses. Beside the imperial palaces in the Kremlin are the Petrofskoi palace and gardens outside of the Saint Petersburg gate, the principal fashionable resort during the summer season, and the palace of the Empress Elizabeth; and among the favorite pleasure grounds are the beautiful gardens of the Kremlin and the Galitzin garden on Sparrow Hill. Moscow is the residence of two archbishops, and of the governor-general of the province.

Manufactures, Commerce, Communications.—Moscow is the first manufacturing city in the empire, and of late years its industrial and commercial activity has greatly increased. The manufacturing establishments give employment to more than 125,000 workmen, and annually turn out goods to the value of about $150,000,000. The principal establishments are for textile fabrics, chiefly cotton, woolen, and silk, besides manufactures of metals, railway trucks, looms, fibrine, paper, leather, and other articles. The machinery employed in the factories is generally of the most improved description, and though partly made in the city largely comes from Britain and elsewhere. From its central position Moscow is the great entrepôt for the internal commerce of the empire. Great facilities for this commerce are given by water communication, which extends on one side to the Baltic, on another to the Caspian, and on a third to the Black Sea; and by the railways to Saint Petersburg, Yaroslav, Nijninovgorod, etc. In winter the traffic over the snow in sledges is enormous. Tea, silk, indigo, and cotton are important articles of trade.

Administration, etc.—Moscow is under the immediate charge of a general governor and a military governor. It is the seat of important civil and criminal courts, and of various superintending boards of police, manufactures, trade, etc.; and has a number of literary, scientific, and other societies of different kinds. Pop. (1891) 822,397; (1897) 977,269, with suburbs 1,035,664, nearly all Great Russians of the Orthodox Greek Church.

History. — Moscow is said to have been founded in 1147 by George Dolgoruki, prince of Kiev. Its nucleus was the Kremlin, which at first was nearly surrounded by a palisade, and formed an important military station. For a long time it continued to be a dependency of the principality of Vladimir; and in 1238, when Batou-Khan devastated Russia, it was sacked and burned. In 1293 it was again sacked, and the inhabitants were dragged away into slavery by Khan Nagai. Ivan Danilovitch of Vladimir took the title of grand prince of Moscow in the early part of the 14th century, and from that time it remained the seat of government until the beginning of the 18th, when the administration was transferred by Peter the Great to Saint Petersburg. Moscow was plundered by the Lithuanians and the Tartars of Tamerlane in the latter part of the 14th century, and was nearly consumed by fire in 1536, in 1547, and again in 1571, when the Tartars set fire to the suburbs, a large part of the population perishing on that occasion. During the insurrections caused by the pseudo-Demetrius (1605–12), when the Poles and Cossacks took the city, it was again partly destroyed. In 1812 it was entered by the French under Murat on 14 September, and on the 15th by Napoleon, who took up his residence in the Terem palace in the Kremlin. The city, deserted by its inhabitants, was set on fire by order of the governor, Count Rostoptschin, compelling Napoleon to leave on 19 October, and to take his final departure on the 23d, and resulting in the disastrous retreat of the French army. The greater part of the city was then destroyed, notwithstanding the efforts of the French to stay the progress of the flames. It was rebuilt within a few years. The railway to Saint Petersburg was opened in 1851. The chief of modern events are the coronations in 1856 of Alexander II., and in 1896 of Nicholas II., at the latter ceremony 2,000 people being crushed to death, and hundreds injured, during the distribution of gifts.

Moseilima. See MOSAYLIMA.

Moseley, mōz'lĭ, **Edward Augustus,** American lawyer; b. Newburyport, Mass., 23 March 1846; d. Washington, D. C., 18 April 1911. He engaged for several years in both the East and West Indian trade. He then studied law, was admitted to the Massachusetts bar, practised as a lawyer, and was also a member of the State legislature for several terms. His chief interest has been the lessening of danger in railroad travel; he has become the leading authority in the United States on all measures or appliances for procuring the safety of railroad employees and travelers, and largely for this reason was appointed secretary of the Interstate Commerce Commission at the time of its formation. On account of his constant efforts in obtaining and enforcing the safety-appliance law, he received numerous testimonials from all the railroad men's organizations in the United States, and the formal thanks of the Commonwealth of Massachusetts "for distinguished services in the cause of humanity." He published 'Arbitration as Applied to Railways and their Employees'; 'Safety Appliances on Railroads'; 'One Hundred Years of Interstate Commerce Law' (1900); 'The Transportation Question as Affected by the Cullom Bill' (1900).

Mosely Commissions, two delegations known as the INDUSTRIAL and the EDUCATIONAL, which visited the United States in 1902 and 1903, to study conditions and methods in their respective branches, for comparison with those of Great Britain.

The Mosely Industrial Commission made a tour of the United States from November 1902 to January 1903, to investigate manufacturing, industrial and commercial lines, which in international competition had seriously affected the commerce and free trade policy of Great Britain. It originated with and was financed by Mr. Alfred Mosely (b. Bristol, England, 1855), a wealthy retired diamond merchant whose relations with American mining and other engineers in South Africa had developed the philanthropic desire to discover the sources of their success, the comparative causes of Great Britain's industrial decline, and to evolve a plan whereby American methods could be introduced into the United Kingdom for the permanent rehabilitation of its economic and industrial status. A suggestion to invite British trade-unions to select a representative from each to form a commission to study American industries and the condition of the workmen was acted upon. Mr. Mosely justly expecting that these secretaries would be in a better position than anyone else to impart the results of their visit, and the conclusions they arrived at, to their various unions. Most of the unions accepted the invitation, electing as representative in nearly every case their general secretary. Twenty-three in all formed the commission and were given a free trip to the States, with expenses paid for nearly three months. Each man was pledged to study conditions carefully and to answer fully on his return questions of the following character:

1. Is the American lad better equipped by early training and education for his work than the English lad?
2. If yes, what changes would you suggest in the English system of education for the working-classes?
3. What are the hours of work in your trade in America, and how do they compare with the hours in England?
4. Does the American workman do more or less in an hour, on the average, than the English workman?
5. When skilled workers on piece-work increase the output per man by their own efficiency, do American employers cut down wages so as to prevent a man earning more than a certain amount?
6. Where weekly wages are paid:
    (a) Do the men show any anxiety to do their best and to give a fair day's work for a fair day's pay?
    (b) On this system do personal energy and initiative meet with a due reward?
7. Are suggestions for improvements made by the employers, the introduction of labor-saving appliances and of up-to-date machines welcomed by the men or the reverse?
8. Are suggestions for improvements made by the workmen welcomed and rewarded by the employers?
9. (a) Do the workmen attend on a larger number of machines than in England?

(b) If yes, does the system benefit both employer and workmen, or does either side reap an unfair advantage from it?

10. Is the American workman capable of exercising initiative and of working without frequent and detailed directions? How does he compare with the English workman in this respect?

11. Does the American workman exert himself at times of special pressure, and at such times do overwork cheerfully? How does his overtime output compare with the output of the normal day, and how does he in these respects compare with the English workman?

12. Are the American employers more accessible to their men than English employers?

13. Speaking generally, are there greater opportunities for the workingman to rise in America than in England?

14. How far is greater output in American factories due to

(a) Longer hours of work?

(b) Greater speed at which machinery is run?

15. Are there any points in American practice which should in your opinion be imitated in English factories?

16. (a) Are American workers better fed than English?

(b) How does the price of food in America compare with that in England?

17. (a) Are American workers better clothed than English?

(b) How does the price of clothes in America compare with that in England?

18. (a) Are American workers better housed than the English?

(b) How does rent in America compare with rent in England?

(c) Do more workers, relatively, own the houses they live in than is the case in England? If yes, to what circumstance do you attribute this?

19. How does the average wage in your trade in America, *expressed in money,* compare with the average wage in England?

20. How does the *value* of the American wage compare with that of the English, *cost of living being taken into account?*

21. Is it true that the American workingman does a larger amount of work in early manhood than the English, but that he deteriorates young, and that his working years are shortened?

22. Is it true that the American workman is thrown out of work at an early age?

23. (a) Is it true that the average life of the American workman is shorter than that of the English workman?

(b) If yes, is this due to overstrain, less healthful climate, or to some other cause?

24. Is a larger or smaller proportion of American workingmen dependent on the public purse than is the case in England?

25. Do the children and friends of American workingmen who are either past work or incapacitated by ill-health or accident help them to a greater extent than is the case in England? If yes, to what do you attribute the difference?

26. Do you consider the general conditions of life of the workman better in America than in England? In what respects might American examples be copied so as to improve the conditions of life in England?

Mr. Mosely and the delegates made a circular tour in which they were afforded every opportunity to inspect some of the largest manufactories in the United States. They visited Niagara, Buffalo, Cleveland, Chicago, Dayton, Pittsburg, Philadelphia and New York, as one party, while individual members also took trips to other points. The delegates took copious notes, and the chief results of their observations were published April 1903 in the ‘Reports of the Mosely Industrial Commission.’

Some of the conclusions arrived at were: The American workman for two and one half days' work receives remuneration equal to that of the British for a week; the American is more temperate than the British; he lives longer; is more thrifty, and after a few years frequently retires with his savings to an easier occupation, usually farming or market-gardening. Labor saving machines were more in evidence in America than in the United Kingdom, but, there was a considerable difference of opinion among the various delegates as to what could be learned from America in their respective trades, for instance, the shipbuilding and bricklaying in England were considered superior to those of America. To the question “Are there greater opportunities for the workingman to rise in America than in England?” “Yes”, came as a unanimous answer. The average workman was considered as good in one country as the other, the difference was to be found in conditions. In Great Britain generations of workers toil in a confined area, and have become hidebound by inherited labor traditions; increased production to them does not mean increased wages — hence a lack of incentive. In the United States, the stimulating climate and abundance of undeveloped resources tend to a constant striving for direct results through the simplest means, whence the wonderful development of machinery, manufacturing equipment, output, increased wages, general prosperity, and well-being of the American workmen, together with a unity of feeling between employers and employees along the lines of increased production, which is not to be found in England. The organization of capital and labor in the United States produced a great impression on the delegates, and the advantages of the Civic Federation to bring together these two great and active factors in production on all disputed questions, and at the initial stages to avert strikes by arbitration, were fully recognized as those of a model organization worthy of immediate adoption. The freedom accorded to religious belief and the excellent public school education of the States, elicited the warmest praise from the Commission, the advantage given to all the American youth being fully apparent.

The success of the Industrial Commission led to the organization of the *Mosely Educational Commission* to the United States, October–December 1903, in which 26 prominent British educators took part at the invitation of Mr. Mosely to investigate

1. The development of individuality in the primary schools.
2. The social and intellectual effects of the wide distribution of secondary education.

3. The effect of specific instruction given (a) in business methods; (b) in applied science.

4. The present state of opinion as to the value of professional and technical instruction of university rank, designed with special reference to the tasks of business life.

As in the work of the Industrial Commission the conclusive deductions drawn were wholly in favor of the system of education in the United States which was described as practical, enlarged, enlightened, up-to-date and scientific. Consult: Mosely, ‘Reports of the Mosely Educational Commission to the United States of America, October–November 1903’ (London 1904).

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Moselle, mō-zĕl (German, *Mosel*), a European river which rises in France on the southeast of Remiremont, in the department of the Vosges, across which it flows northwest, through the department of Meurthe-et-Moselle. Thence it proceeds northeast through German Lorraine into Rhenish Prussia. After passing Trèves in a remarkably winding course, it falls into the Rhine at Coblenz; total course, about 360 miles, of which 220, commencing at the junction of the Meurthe, are navigable. Its principal affluents are, in France, on the right bank, the Valogne, Meurthe, which joins it below Nancy, and Seille, which it receives at Metz; on the left bank, the Madon, Math, Orne; and beyond France, on the right bank, the Sarre, which joins it above Trèves; and on the left bank, the Sure, Kill, and Elz. Of these affluents the Meurthe, Sure, and Sarre are navigable.

Mosen, Julius, German poet and littérateur: b. Marieney, Saxony, 8 July 1803; d. 10 Oct. 1867. He studied jurisprudence at Jena and Leipsic, and for several years held minor judicial positions and practised his profession in his native province. He then moved to Dresden, where he became noted for his poetry and dramatic works. Among his poems are: ‘Lied vom Ritter Wahn’ (1831); ‘Andreas Hofer’ (1836); ‘Ahasrer’ (1838); and several ballads included in the ‘Gedichte’ (1836). Of his tragedies the best known are: ‘Die Bränte von Florenz’ (1836); ‘Neudelin un Helena’ (1836); ‘Kaiser Otto III.’ (1840); ‘Bernhard von Weimer’ (1855); ‘Der Son des Fürstein’ (1858). His most noteworthy dramas and comedies are: ‘Heinrich der Finkler’ (1836); ‘Cola Rienzi’ (1836); ‘Johann von Oesterreich’ (1842); and ‘Die Wette’ (1842). His dramatic works were published (Stuttgart 1862) and his complete works in eight volumes (Oldenburg 1863–4, and Leipsic 1871).

Mosenthal, mō'sĕn-täl, **Joseph,** German-American musician: b. Cassel, Germany, 30 Nov. 1834; d. New York 6 Jan. 1896. He studied music in Germany and in 1853 removed to the United States where he was organist and choir director of Calvary Church, New York, 1860–87. He conducted the famous Mendelssohn Glee Club in New York in 1867–96 and played the violin in several leading orchestras there. He composed both church and secular music, among which are the psalm ‘The Earth is the Lord's’ and part songs for ‘Thanatopsis,’ ‘Music of the Sea,’ etc.

Mosenthal, Salomon Hermann von, German dramatist: b. Cassel 14 Jan. 1821; d. Vienna 18 Feb. 1877. He studied at the University of Marburg and in 1851 obtained a position under the Austrian government. His best-known dramas are ‘Deborah’ (1850); the original of ‘Leah the Forsaken,’ and ‘Sonnenwendhof’ (1857), which were translated into English, Danish, Hungarian, and Italian. He wrote also ‘The German Actors’ (1863); ‘The Mayor of Altenburen’ (1868); ‘Maryna’ (1871); the tragedies ‘Düweke’ (1860); ‘Pietra’ (1865); etc.

Moser, mō'zĕr, **Gustav von,** German dramatist: b. Spandau, Prussia, 11 May 1825. He obtained a military education and after serving in the Prussian army resigned in 1856 to devote himself to literature. He has produced more than 40 successful comedies, several of which have also been well received in English translations. Among his plays may be named ‘Das Stiftungfest’ (1873); ‘Ultimo’ (1873); ‘Der Bibliothekar’ (The Private Secretary) (1878); ‘Der Veilchenfresser’ (1876); ‘Krieg im Frieden’ (1880). The uniform edition of Moser's plays begun in 1873 included over 20 volumes.

Moser, Johann Jakob, German jurist and publicist: b. Stuttgart 18 Jan. 1701; d. there 30 Sept. 1785. He received his education at the University of Tübingen; in 1720 became teacher of law there; and in 1727 was appointed to the full professorship. In 1736 he became a director of the university at Frankfort-on-the-Oder, but in 1739, having fallen into disfavor with Frederick William I., was compelled to resign. He then founded the academy at Hanau for the education of the young nobility in political science. He is credited with being the first to publish a systematic account of European international law. He was a prolific writer, his books numbering over 400, the most important of which are: ‘Deutsches Staatsrecht’ (21 vols., 1737–54, with additions of 2 vols. 1766–75, and 3 vols 1781–2); ‘Lebensgeschichte’ (1783).

Moser, Justus, German historian and humorous writer: b. Osnabrüch 14 Dec. 1720; d. there 8 Jan. 1794. He studied jurisprudence at Jena and Göttingen; in 1747 became attorney for the government; and for 25 years during the minority of Duke Frederick of York acted as his legal adviser; and was afterward appointed a judge. His most important work is ‘Osnabrüchische Geschichte’ (2 vols 1768; 3d ed. 1820; Vol. III. edited by Herbert von Bar 1824). Of his humorous writings perhaps the most striking is ‘Harlekin,’ in which he attacks hypocrites and pedants of all kinds. He also published some valuable essays on local topics entitled ‘Patriotische Phantasien’ (4 vols. 1774–86). An edition of his complete works was published by Abeken in 10 vols (Berlin 1842–3).

Moses, mō'zĕz, the prophet, teacher and legislator of the Hebrew race. His life may be divided into three equal portions of 40 years each, which include his training in Egypt, his exile in Arabia, and his government of the Israelite nation in the wilderness.

Moses was born 1738 B.C. at Heliopolis, while his nation was sunk in the deepest depression of servitude. His beauty as a babe was noted by the Egyptians and the story of his being consigned to the Nile in a basket of papyrus is well known.

The first period of the life of Moses must be considered to comprise his education in all the wisdom of the Egyptians. He grew up at Heliopolis where he learned the whole range of Greek, Chaldaic and Assyrian literature. From the Egyptians he learned mathematics. He taught grammar to the Jews and was in every way a learned man of his age.

Moses became, however, the object of envy and hatred by those who were about him. His spirit was rash and the servile and treacherous temper of his own compatriots was against him. He fled into Midian 1698 B.C. There it was that he met with Jethro, whose daughter Zipporah he married. It was in the seclusion and simplicity of his life with Jethro's daughter that Moses received his call as a prophet. This took place in the valley of Shoeib or Hobab on which now stands the convent of St. Catherine whose altar is said to be on the site of the Burning Bush. This bush became the symbol of the Divine Presence. The rocky plateau on which it appeared became at once holy. The call was twofold, revealing first of all the Divine Name and secondly giving the mission to Moses.

Moses returned to Egypt from his exile 1658 B.C. Passing over his experiences in private life his public career may be said to commence when he started forth as the deliverer of the children of Israel from the bondage of Egypt.

The most important function of Moses was that which he exercised as a lawgiver of the Israelites. The Israelites were destined as the people of Promise to enter into the land of Canaan. Moses victoriously repulsed the attack of the Amalekites, marched to Mount Sinai where he signally punished the defection of his people, and gave them the law as a testimony of Divine justice and mercy. It was important that a man like Moses should have been at the head of Israel during the vicissitudes of the wilderness and the approach to the Promised Land. Moses made excellent preparations for the conquest and distribution of Palestine and concluded his life of public service by the deliverance of valuable admonitions, while at the same time he transferred his position to Joshua, no unworthy successor.

The death of Moses has always been involved in mystery. In the book of Deuteronomy is described his last long farewell to his people. His death took place in the palm groves of Abila. His age was 120 years, and he is said to have died with unabated vigor.

The great object of his legislation is to inculcate the doctrine that Jehovah is the only God, who will allow no other god beside himself, nor any visible image of his being; that he is himself the king of his people, and that he will rule them by his priests. Hence the laws by which Moses regulates the worship of the Hebrews, the administration of the government and of justice, and even directs their manners, and lays down rules for the care of their health, bear the marks of their heavenly origin. Arising from the wants of the moral and physical nature of man, they were excellently adapted to the peculiar character of the people, to the climate, and to the political position of the land appointed for their dwelling, and to the plan of Providence of making this people a depository of a divine revelation to be developed in the fulness of time, and finally extended over the world. These laws forbid intermixture with other nations, the introduction of foreign customs, and the adoration of strange deities. As a people peculiarly dedicated to God, the Hebrews were to be separated from all neighboring nations, and to stand separate and independent, relying upon God as their Lord and Master. Regulations extending to the minutest particulars of the daily occurrences of life, in which even the selection and preparation of their food and the care of personal cleanliness were not forgotten, gave them habits adapted to their character and religious destination. A ritual composed of a thousand minute ceremonies, and as a whole allegorically designating a covenant with God, to be incessantly renewed by offerings, prayer, and purification, imposed on them the duty of continual diligence in the service of their heavenly King. To the race of Levi, to which Moses belonged, he assigned the care of the religious service and of seeing that the laws were obeyed, investing, not his sons (whom he allowed to take their place among the common Levites), but the descendants of his brother Aaron, as God commanded, with the first office in the kingdom, that of high-priest. To this tribe, excluded from all property in land, the other tribes were to pay tithes. They were subjected to the authority of elders and judges, and the firmness of their political union was secured by certain festivals to be celebrated by them in common, and by exclusive devotion to the service of God in the tabernacle, a movable temple regarded with awe as the appointed dwelling of Jehovah, into the interior of which the priests alone were allowed to enter, and where, moreover, all the taxes were deposited, so that it was the central point of all the riches of the nation.

These are the chief points in the legislation of Moses, which, even if it displays some Egyptian features, yet plainly manifests the endeavor to wean the Hebrews from Egyptian customs and prejudices, and to elevate them to political and religious independence, and far surpasses, in originality and elevation of principle, in consistency and expressiveness, and, what most proves its heavenly origin, in proofs of true humanity, the boasted legislation of Solon and Lycurgus. Yet its importance was not at once recognized by the Hebrews.

When they were already near the end of their journey toward Canaan, Moses saw himself compelled, in consequence of new evidences of discontent, to lead them back into the desert, and 40 years of toilsome wandering must be passed there: the severe punishments which the law threatens against transgressors must be executed in all their rigor: all those who had attained to man's estate at their departure from Egypt must die before the law could be thoroughly known and become habitual with those who had been born during the wandering. Moses himself, distressed with cares, troubles, and occupations of all kinds, was not permitted to live to see the complete accomplishment of his plan on account of a murmur which, in the midst of his distresses, he allowed to escape against his God. After he had appointed Joshua to be the leader of the Hebrews, and had taken a solemn farewell of the people, he ascended a mountain beyond Jordan, from which he surveyed the land of promise, which he could not enter, and closed his eventful life in his 120th year.

All superstitious reverence for his bones or his place of sepulture was prevented by the secrecy of his burial, and its effectual concealment from the people. For an account of the attitude of modern criticism toward the life and work of Moses consult such articles as those on Moses and Israel in the 'Encyclopedia Biblica' (Vols. II.-III.), and histories of Israel by Wellhausen, Renan, etc. On the so-called books of Moses see PENTATEUCH.

Moses, Bernard, American historian and political economist: b. Burlington, Conn., 27 Aug. 1846. After graduating from the University of Michigan in 1870, he went to Europe for further study, receiving his Ph.D. from Heidelberg in 1873. In 1875 he became professor of history at Albion College, but since 1876 has been professor of history and political economy at the University of California. His more important works are: 'Politics' (with W. W. Crane); 'Federal Government in Switzerland'; 'Democracy and Social Growth in America'; 'Establishment of Spanish Rule in America.' He was appointed in March 1900 a member of the United States Philippine Commission.

Moses, Franklin J., American jurist: b. Charleston, S. C., 13 Aug. 1804; d. Columbia, S. C., 6 March 1877. He was graduated from the South Carolina College in 1823, studied law and began the practice of law at Sumter. In 1841 he was elected to the State Senate and re-elected for 30 years. In 1866 he was elected circuit judge and after the reconstruction period chief justice of the supreme court of the State, being re-elected in 1872 and holding the office at the time of his death.

Moses, Raphael J., American lawyer and politician: b. Charleston, S. C., 20 Jan. 1812; d. Brussels, Belgium, 13 Oct. 1893. He first engaged in business and then having acquired a knowledge of law in 1837, practised in Apalachicola, taking an active part in politics. He removed to Columbus, Ga., in 1849 and at once became influential in politics. When the Civil War broke out, he and three sons enlisted in the Confederate forces. In 1864, after serving on the staff of Generals Toombs and Longstreet, he was made civil commissionary of Georgia, with rank of major. After the war he resumed his law practice and in 1866 was elected to the State legislature.

Mosheim, Johann Lorenz von, yō'hän lō'rĕnts fōn mōs'hīm, German Protestant theologian: b. Lübeck 9 Oct. 1694; d. Göttingen 9 Sept. 1755. He studied and taught at Kiel; became professor of theology at Helmstedt in 1723, abbot of Marienthal in 1726, and professor (1747) and university chancellor (1755) at Göttingen; was a notable preacher, theologian and church historian; and wrote 'Institutiones Historiæ ecclesiasticæ' (1755, translated into English by Maclaine); 'Institutiones Historiæ Christianæ' (1763); 'Attempt at an Impartial and Thorough History of Heresies' (1748-50); 'Morals of the Holy Writ' (1770-8); etc.

Mosher, mō'zhėr, **Eliza Maria,** American physician: b. Cayuga County, N. Y., 1846. She was graduated from the University of Michigan in 1875, and studied at the School of Medicine in Paris from 1879-80. She was resident physician at the Massachusetts Reformatory for Women in 1887-9, and director of the institution in 1881-3. In 1884 she went to Vassar College as professor of physiology and resident physician; from 1886-96, she was engaged in general medical practice in Brooklyn, N. Y., and then became professor of hygiene in the Department of Literature, Science and Arts, and women's dean at the University of Michigan, holding this position till 1902, when she returned to her practice in Brooklyn. She has been lecturer at the Chautauqua Summer School of Physical Education since 1888.

Moskva, mŏsk-vä', Russia, an affluent of the Oka a tributary of the Volga, which rises in a marsh in the east of Smolensk, flows east to the city of Moscow, and thence 112 miles southeast to the Oka, which it joins near Kolomna after a total course of 305 miles. It is connected with the Volga by the Moskva Canal. It is navigable from its mouth to Moscow except between November and April when it is frozen.

Mos'lem, or **Muslim.** See MOHAMMEDANISM.

Mosler, mōz'lėr, **Henry,** American artist: b. New York 6 June 1841. A diligent student of wood-engraving he was draughtsman on a Cincinnati comic weekly (1855), studied with James H. Beard (1859-61), and was art correspondent for 'Harper's Weekly' with the army of the West 1862-3. Realizing the need of study he followed art at Düsseldorf and Paris (1863-6), returning to Europe in 1874. He has resided in Paris since 1877, and has been a successful exhibitor and prize winner at many exhibitions at home and abroad. His specialties are portraits, figure paintings, and groups of figures.

Mosque, mŏsk (Arabic *mesjid,* Italian *moschca*), a Mohammedan house of prayer, in the Moresque or Saracenic style of architecture. The mosques of the Arabs often include, in a quadrangular area, an immense quantity of columns ranged in files, the multiplicity and extent of which impress the mind of the beholder with surprise and admiration. These columns are, in numerous instances, the rich spoils of antique monuments. Every province of Turkey has its own particular style and taste with regard to these religious structures, as the Moresque architecture possesses no fixed rules, deeming lightness and elegance alone to be the fundamental laws of architecture. In these Mohammedan churches we find neither altars, nor paintings, nor images, but a great quantity of lamps, of various kinds, which form the principal interior ornament, and some sentences from the Koran written on the white walls. The buildings are often quadrangular in plan, and have an open interior court, where are fountains for ablutions. The floor is generally covered with carpets, but there are no seats. The Mohammedan on entering a mosque must take off his shoes. The finest of the mosques in Constantinople and in the world is that of Saint Sophia. The imperial mosques have frequently public schools, hospitals, and also kitchens for cooking food for the poor.

Mosquera y Arboleda, mōs-kä'rä ē är-bō-lā'dä, **Tomás Cipriano de,** Colombian politician and president: b. Popayan 20 Sept. 1798; d. Coconuco 7 Oct. 1878. After three years of service in the patriot army he was captured by the Spaniards, when he was only 18, but he escaped at Jamaica, returned to the army, and in 1829 was made general by Bolivar, who made him also envoy to Peru. After Bolivar's death Mosquera traveled in North America and Europe. He became a senator in 1833; was president of New Granada 1845–9; in 1859 led the federalist revolt against Ospina, adopted a federal constitution by which the name of the country was changed from New Granada to the United States of Colombia, and became dictator of the new federation. His power was checked by a revolt led by Canal, with whom Mosquera in 1862 came to terms. Under the constitution then adopted Mosquera was elected president in 1863 and in 1866; the latter term was cut short by a successful revolution due to the president's arbitrary use of power. He was banished to Lima for two years, but upon his return again entered politics, was governor of Cauca, and became a member of Congress. He wrote on the geography of New Granada, and a valuable life of Bolivar (1853).

Mosquitia, mōs-kē-tē′ä. See MOSQUITO COAST.

Mosquito, a name, the diminutive of the Spanish *mosca,* a fly, applied to insects of the dipterous family *Culicidæ.* Typical mosquitoes have the following characteristics: The mouth is provided with a prolonged, suctorial, piercing proboscis; the greater part of the body and head and portions of the wings and legs are covered with scales which determine the color pattern; the complicated venation of the wings is also highly characteristic. These features distinguish mosquitoes from the related midges (*Chironomidæ* and *Cecidomyidæ*) and the black flies (*Simulidæ*) with which they are popularly confused; and from the crane-flies (*Tipulidæ*) which inspire most of the newspaper stories of gigantic mosquitoes. Not less than 22 genera and 350 species are now known, and activity in their collection and study is bringing many new ones to light. The species are based largely upon differences in the form and arrangement of the scales and the resulting coloration, the form of the foot-claws, etc. Mosquitoes are cosmopolitan, only a few oceanic islands, deserts and mountain tops being free from them. Frequently they occur in vast swarms, and they abound equally in arctic regions, as Alaska and Greenland, and in the tropical swamps of Africa and South America, while at many intermediate points they are intolerable pests. Vertically they range from the seashore to altitudes of at least 13,000 feet. While many species are local, others are very widely distributed.

Development.—The typical life-history of a mosquito is as follows: The eggs are deposited at night in or rarely near shallow water, which is usually fresh but in the case of a few species may be brackish or salt. After one or a few days they hatch into legless, aquatic larvæ, known from their activity as wrigglers. These have the mouth provided with small jaws for browsing at the bottom, and with brushes of hairs whose movements induce currents in the water and bring to the mouth floating particles or minute plants and animals to serve as food. The thorax is more or less swollen, and the abdomen slender and nine-jointed, with the last, or anal, segment bearing two pairs of leaf-like appendages and a more or less conspicuous fan of spreading hairs. On the dorsum of the eighth segment is a pair of spiracles, or breathing-pores, usually borne at the end of an elongated tube or siphon. By their active wriggling the larvæ come frequently to the surface to breathe, and then sink by gravity quietly to the bottom. After one or several weeks the larvæ molt finally and transform into pupæ, which have the head and thorax closely united, and the latter greatly enlarged, with the form of the future legs and wings apparent. At the tail end is a pair of fin-like expansions; while the respiratory organs, instead of being near the end of the abdomen, have the form of a pair of large mouthed tubes or funnels on the dorsum of the thorax. Like the larvæ the pupæ are active wrigglers, but, unlike them, are buoyant and naturally float at the surface with the respiratory funnels uppermost and exposed. When alarmed they display much activity and wriggle violently toward the bottom. The imagos escape from the pupal investments at the surface, and windrows of cast-off skins are thrown up at the water's edge. The males, which transform first, hover in little clouds and are sought by the females. In the males the antennæ are broad and feather-like, in the females slender and simply hairy. The duration of the period of aquatic life varies with the species and temperature; in our common *Culex pungens* it may be only 10 days, so that many generations may be produced during a favorable season. The winter may be passed in any stage from egg to adult, all of which are extremely resistant to cold, and the aquatic stages capable of withstanding repeated freezing and thawing. The hibernating imagoes, which are found in houses and other sheltered places, may become active on warm days and in the case of *Anopheles,* at least, are chiefly fertilized females.

Food and Enemies.— Notwithstanding that the chief human interest in mosquitoes arises from their blood-sucking habits, yet the taste for blood is certainly an acquired one and a relatively unimportant factor in the lives of the majority of mosquitoes. The normal food of both sexes of many species, and the only food of the males of nearly all, consists of the juices of flowers, fruits, and other plant parts. In a few species a meal of blood by the female seems requisite to the maturation of the eggs, but this is decidedly exceptional. Most of the species are active chiefly at night, but a few, like *Stegomyia fasciata,* in which also both sexes bite, are most vicious during the early afternoon. The bites of all species are not equally irritating, probably the result of dissimilar qualities of the salivary secretion which is poured into the wound to facilitate the blood flow. Ammonia and glycerine allay the irritation. Besides the warm-blooded birds and mammals, mosquitoes attack fishes, frogs, turtles, and even other insects. In turn they have many natural enemies. The aquatic stages are preyed upon by carnivorous fishes, water-newts, larvæ of dragon-flies and aquatic beetles, and leeches. Vast numbers of the flying insects are destroyed by night-hawks and bats, and during the day they are pounced upon by dragon-flies, hornets, and other carnivorous insects, and snapped up by swallows and swifts as they skim the grassy meadows. Of their parasites the recently discovered worm, *Agamomermis culicis,* is considered to exert an important checking influence in some years.

Contrary to the common belief, mosquitoes are weak fliers and usually seek shelter when the wind blows, so that railroad trains, ships and wagons are far more effective than their own wings in their dissemination.

Kinds and Characteristics.—Within the limits of North America nine genera and upward of 30 species are known to occur. Of these only certain species of *Culex, Anopheles* and *Stegomyia* are important. The following table exhibits some characteristics of each genus in all stages:

EGGS.

Culex.—Laid in floating boat-shaped masses 1/5 to 1/3 inch long, and containing 200 to 400 conical eggs glued together in one layer, with the large ends downward.

Stegomyia.—Laid singly, short, elliptical, with a coating of air-cells.

Anopheles.—Laid singly, but floating in irregular groups, each egg long elliptical, dark colored, with a sculptured surface and an incomplete wrinkled equatorial girdle of air-cells.

LARVA.

Culex.—Head and thorax very broad; hairs in tufts, simple; respiratory tube much elongated; colors generally pale; hang obliquely from the surface of the water; very active.

Stegomyia.— Generally similar to *Culex,* but head, thorax and eyes much smaller, and respiratory tube much shorter.

Anopheles.— Hairs in tufts, generally branched and especially long on sides of thorax and anterior segments of abdomen; last abdominal segment with long plume-like hairs; no respiratory tube; colors dark; rest nearly prone at surface of water; relatively sluggish.

PUPA.

Culex.— Respiratory trumpets relatively slender and compressed, with long very oblique slit-like openings.

Stegomyia.— Respiratory trumpets, conical, moderately compressed, with very short stalks and short only slightly oblique orifices.

Anopheles.— Respiratory trumpets with long slender stalks and very broad truncate funnel-shaped ends, not at all compressed nor oblique.

IMAGO.

Culex.—Palpi of female short, of male nearly as long as proboscis but not club-shaped; when resting, the abdomen is bent at an angle with thorax and head, and nearly parallel to the surface of support (wings unspotted in our species).

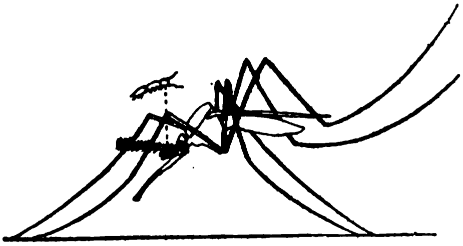

FIG. 1.— Resting attitude of female Culex with the palpus enlarged.

Stegomyia.—Like *Culex,* but scales of head broad and flat, body generally stouter, and the abdomen and legs black-and-white banded.

Anopheles.— Palpi of both sexes about as long as proboscis, club-shaped in the male; in resting attitude all parts, including proboscis, in line, tip of abdomen directed away from surface of support; wings generally spotted.

Until within about a decade mosquitoes were regarded merely as intensely annoying pests, but since the definite discovery of their relation to disease-transmission their economic importance can scarcely be overestimated. Besides several diseases of the lower animals three serious human maladies — malaria, yellow fever and elephantiasis — have been definitely traced to their agency, and they are suspected of others.

Mosquitoes and Malaria.—Malaria is one of the greatest scourges to which man is subject. Its cause is fully established to be a minute unicellular animal parasite or hæmosporidium of the class *Sporozoa* (q.v.), living within the red blood-corpuscles and introduced by the bite of a mosquito. Each well-marked variety of malaria has its especial causal parasite, which passes through a complicated life-cycle, the principal features of which, as exhibited by *Laverania malariæ,* the parasite of pernicious or tropical malaria, are shown in Fig. 2. The parasites enter the blood as minute slender sporozoites (XIX), penetrate red blood-corpuscles, and become amœboid trophozoites (I-V) which feed on the substance of the corpuscles and gradually destroy them, at the same time depositing granules of pigment or melanin. With the completion of their growth the amœbulæ undergo segmentation or schizogony, each dividing into a mass of nucleated bodies (6 to 10) which escape into the blood-plasma by the disintegration of the red corpuscle. The free bodies, or merozoites, seek and penetrate fresh corpuscles, whereupon the cycle begins anew, simultaneously with a paroxysm of fever. Most of the parasites continue this process repeatedly, but for some unknown reason a few assume a crescentic form (VI) and escape from the corpuscle without division. As long as the crescent-shaped bodies remain within the warm-blooded host they undergo no further material change, but if they are in any way removed, as into the stomach of a mosquito, they enter upon a second series of changes. First they become spherical, in which condition some (female gametes, Xb) remain, others (male gamates, Xa) produce filiform bodies. This is the sexual generation, the utility of which is fulfilled when a single male gamete unites with a single female gamete (XI) to produce a zygote (XII), comparable to the fertilized ovum of a higher animal. If this union

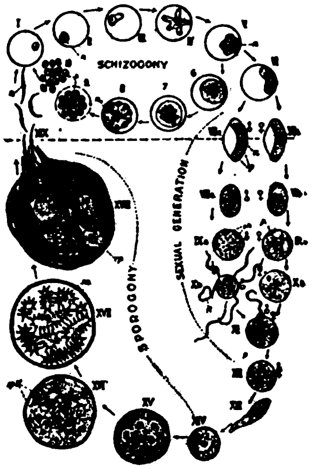

FIG. 2.— Diagrams of the life-cycle of Laverania malariæ. The stages above the dotted line occur in human blood, those below, in the mosquito.

takes place in the stomach of an *Anopheles*, but so far as now known under no other condition for the human malarial organism, the zygote becomes amœboid (XIII) and travels to and penetrates the wall of the stomach, beneath the muscular layer of which it rapidly grows to about six times the diameter of the zygote and forms a spherical cyst projecting from the stomach-wall into the body-cavity. In the meantime the contents of the cyst subdivide into numerous nucleated bodies (XIV-XVII), each of which finally becomes a sporozoite like those with which the infection began. When mature the sporozoites are freed into the body-cavity by the rupture of the wall of the sporocyst, when they migrate to the salivary glands, penetrate their walls, and reach the proboscis through the salivary duct. When a mosquito harboring the parasites in this stage bites a susceptible human being, some of the spores pass into the blood with the saliva and induce an attack of malaria, mild or severe according to their number and other conditions. Thus it will be seen that the malarial organism once introduced into the human system may continue to multiply indefinitely by the asexual method unless destroyed by drugs or some reaction of the organism, but that it can be transferred naturally to another person only through the intermediation of a mosquito and the intervention of the sexual generation. Properly speaking, man is the intermediate, the mosquito the final or definitive host, though the latter appears to suffer no ill consequences from the presence of the parasite. In pernicious tropical malaria, or æstivo-autumnal fever, the period for the complete development of sporozoites in the mosquito is seven or eight days, but owing to the vast number of parasites of different broods present in the blood and their overlapping stages of development the exact time of schizogony is doubtful. Tertian and quartan fevers, the two best differentiated types of mild or benignant malarial fevers, are caused by related parasites known respectively as *Plasmodium vivax* and *P. malariæ,* which differ from *Laverania* chiefly in the replacement of the crescent stage by an immediately spherical gametocyte. Asexual sporulation recurs in the first form at intervals of 48, and in the latter of 72 hours, corresponding with rhythm of the fever's paroxysms. Daily or other intermediate recurrences are due to double or triple infections, in which the different broods sporulate on alternate days or in other combinations.

Although not a few keen observers in many countries and for many years have more or less vaguely noticed a relation between mosquitoes and malarial infection, the definite statement of the nature of this relation and its scientific demonstration are very recent. In 1880 Laveran, a surgeon in the French army, discovered the amœbulæ in the blood of malarial patients in Algiers; the development of the sexual generation in the mosquito, and its relation to Laveran's parasite, were traced by Ross in 1897–8, while to the Italian zoologist Grassi is due the first clear demonstration of the effectiveness of preventive measures directed at the mosquito. Our scientific knowledge of the subject has been almost entirely created within the five years subsequent to 1898, and workers in many countries are constantly adding details. That several species of *Anopheles*, and especially *A. maculipennis*, are the chief, and so far as known the sole disseminators of all types of malarial fever, is absolutely and thoroughly demonstrated from every standpoint. Many attempts to infect *Culex* with the human malarial parasites have failed, the gametocytes, as well as all other stages, being digested in the mosquito's stomach, although species of this genus are the normal hosts of the hæmosporidia which cause malarial affections in birds and other lower animals. Practically every fact known concerning the etiology of malaria adds to the evidence for the mosquito-malarial relation, and not a single one is definitely opposed to it. Still there remain some obscure points, especially in the relation of the different types of the disease to their specific parasites and of these to specific mosquito-hosts.

Mosquitoes and Yellow Fever.—In the case of yellow fever our knowledge is in a very different and less satisfactory state. The relation of mosquitoes to this disease was suspected by Dr. Finley as early as 1881, but his theory excited little interest until, upon the occupation of Cuba by the American navy, a Yellow Fever Commission of inquiry, headed by Major Reed, was appointed. By a series of very careful experiments it has been established that mosquitoes are agents in the dispersal of this disease, and at the same time the old view of infection by contact and the old practice of isolation and fumigation for prevention have been nearly repudiated. Indeed, the success of these experiments had a most melancholy demonstration in the death of Dr. Lazear, a member of the Commission and a martyr to the cause of scientific investigation. The particular species of mosquito which transmits yellow fever is *Stegomyia fasciata*, an especially fierce biter in the early afternoon, which is found in the tropical parts of both hemispheres, and in America as far north as Virginia. All efforts to determine the pathogenic organism of yellow fever have hitherto failed, chiefly owing to its minuteness, which is so extreme that the blood of a yellow fever patient loses none of its infectiousness by passing through a Pasteur filter. Claims have been made for several species of bacteria, especially the *Bacillus icteroides* of Sanarelli, but have been combated by the American commissioners. The period of incubation required within the mosquito points to a sporozoan.

Agency in Other Diseases.— Elephantiasis or filariasis, like malaria, results from the presence in the blood of an animal parasite, but one of a very different nature. The adult males and females of the *Filaria*, which is a slender nematode worm, live together in the subcutaneous lymph vessels, and produce enormous numbers of living, minute embryos which swarm in the blood, usually passing into the superficial capillaries at night, and retreating to the deeper vessels by day. This peculiarity first led Manson to suspect the mosquito as a means of distribution, and as a result of his studies and those of Bancroft and others on the *Filariæ* of man and the dog, it is now known that when infected blood is swallowed by *Culex fatigans* and other mosquitoes the embryos pass through certain stages of development within the intestine and malpighian tubules, and then migrate through the body-cavity and tissues to the proboscis, from which human infection occurs. About three weeks are required to complete the development within the mosquito, and a year before the worms become sexually mature in the final host. Elephantiasis is a dreadful and prevalent disease in tropical countries, and is frequent in the Southern States, but rare in temperate climates.

The mosquito is suspected of being instrumental, with other blood-sucking insects, in the spread of other parasitic and bacterial diseases, and undoubtedly many important discoveries await the careful and energetic investigator in this field.

Restraining Local Pests of Mosquitoes.— The possibility of the control or complete extermination of mosquitoes is now receiving very serious attention from zoologists, physicians, and sanitary engineers, and is encouraged by local and national governmental grants. Wherever the problems have been carefully considered, as in New Jersey, Long Island, and Winchester, Va., in this country, much has been already accomplished toward the mitigation of the pest, and a very hopeful feeling of complete success exists. As to measures, the complete destruction of all breeding places by the draining of swamps, pools and ditches is the most effective and permanent. This must be supplemented by emptying or suitably protecting by screening against the access of gravid mosquitoes all artificial vessels, such as pails, rain barrels, cisterns, privies, and drains, which contain standing water in which mosquitoes may breed. A most effective and simple measure for local application is to pour a small quantity of kerosene upon the surface of the water of breeding places. This spreads as a delicate film which deters the larvæ and pupæ from coming to the surface to breathe, so that they quickly suffocate, and at the same time kills or drives off females which come to lay their eggs. The application should be repeated at intervals of two or three weeks. Small fishes and the other natural enemies named above may be introduced into breeding places to good purpose; and it has been found that duckweed and other plants which cover the surface of the water in a close mat render pools unsuitable for breeding purposes. The usual methods of ridding houses of mosquitoes by fumigation, of preventing their entrance by thorough screening, and of protecting the person by the application to the skin of oil of citronella and other substances have of course their value; and it has been shown by the experiments of Grassi and others that this method alone is sufficient to grant immunity from malaria to inhabitants even of such fever-scourged districts as the Campagna of Rome. For the medical treatment of malaria we have a powerful specific in quinine, which is most effective at the time of the paroxysms, when the sporulæ are free in the blood-plasma and most susceptible to the action of the drug.

Bibliography.— As an introduction to the already extensive literature of the subject the following should be consulted: Theobold, 'Monograph of Culicidæ' (London, 1901); Howard, 'Mosquitoes' (New York, 1901); Smith, Johnson and others, 'Reports' of the New Jersey Agricultural Experiment Station (1900 —); King, 'Mosquitoes and Malaria,' Popular Science Monthly, 1883; Grassi, 'Die Malaria' (1901); Lankester, 'Treatise on Zoology,' Pt. I. (London, 1903); Nuttall, 'Insects and Disease,' Johns Hopkins Hospital Reports VIII., Nos. 1 and 2, 1899; Bancroft, 'Filaria,' Jour. Royal Society N. S. Wales (1901); and Publications of the U. S. Department of Agriculture and Marine Hospital Service.

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Mosquito Bee, one of the small, gregarious, stingless honey-bees of the genera *Trigona* and *Melpona,* which make very large combs of bitterish honey in the tropical forests. Ordinarily they place these deposits in hollow trees, but sometimes suspend them from branches, protected from enemies in various ways.

Mosquito Blight, a disease of oriental tea-plants resulting from the attacks of great numbers of plant-bugs of the family *Capsidæ.* They breed upon the plant, and young and old suck its juices.

Mosquito Coast, or **Mosquitia,** Central America, an extensive region on the Caribbean Sea, forming the eastern seaboard of Nicaragua; area 26,000 square miles. For a considerable period it was governed, under British protection, by a native chief, but in 1860 it was made over to Nicaragua. (See CLAYTON-BULWER TREATY.) In 1894 it was incorporated with Nicaragua, and is now known as the department of Zelaya. Capital, Bluefields.

Mosquito Extermination. The mosquito has always been with us, but its true character was recognized only a short time ago; and very many intelligent people, well informed on other important subjects of the day, do not yet know the mosquito sufficiently to appreciate the advisability and the feasibility of its extermination.

For reasons of convenient explanation in this article, mosquitoes in general will be divided into three distinctive kinds, a typical one of each kind being selected for consideration. To consider in a work of this character every species of mosquito would be tedious and useless, as so many varieties exist, and all are not yet discovered. In Louisiana alone 32 kinds have been found, and more are looked for.

Those who demand scientific exactness and further information are referred to the appropriate text-books of entomology, bacteriology, and medicine, and to the excellent article in this encyclopedia on the mosquito, by Mr. Moore.

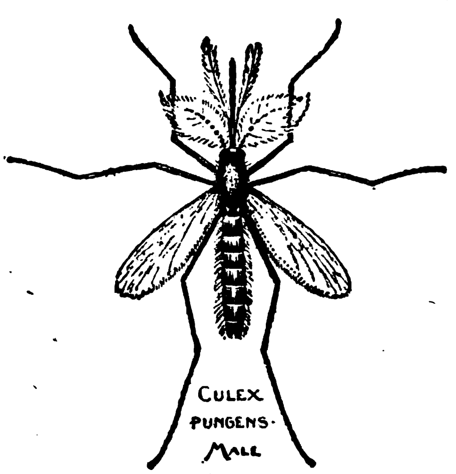


FIG. 1.

MOSQUITO EXTERMINATION

Illustrations are here given of the *Culex* or gutter mosquito, the *Anopheles* or swamp mosquito, and the *Stegomyia,* or cistern mosquito. These are all mosquitoes, as all adult males of the human family are men, but the difference between these kinds of mosquitoes is as great and important as that between the white man, the black man, and the red man — greater, even, and more important.

Culex pungens prefers the gutter, and may be likened to the sparrow among birds; it is noisy and numerous, and always hungry.

The male insect (Fig. 1) presents a rather bushy head-dress, by which it may be easily distinguished from the plainer but more dangerous female. Male mosquitoes are not bloodsuckers, but vegetarians; for the reason that the male insect cannot pierce the skin, and must therefore subsist on food more easily obtained.

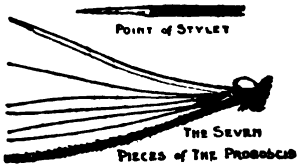


FIG. 2.

The feeding organ of the mosquito, called the proboscis, is composed of seven parts (Fig. 2), which together form the organ by means of which the blood is reached and through which it is obtained.

In the male insect the stylet, or piercing instrument, is adherent to the neighboring parts, and cannot move sufficiently to puncture the skin.

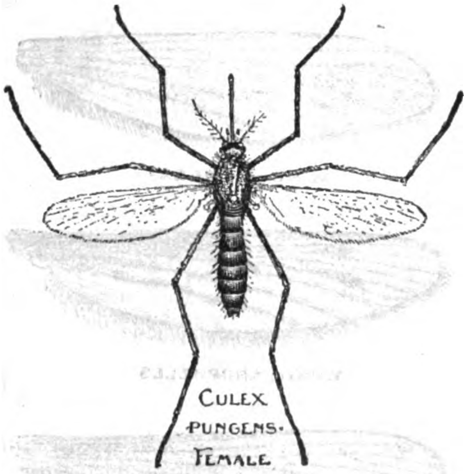


FIG. 3.

The female insect (Fig. 3) is plain as compared with the male. The palpi, those projections on either side of the central proboscis, are much shorter in the female; and the organs to the outer side, the antennæ, are not as beautifully bushy. The female of the *Culex* is very annoying, but is not known to transmit disease in this country, though it is suspected of conveying dengue fever. In eastern tropical countries a species of the *Culex* is connected with the disease known as elephantiasis.

The *Anopheles* is the spotted-winged swamp mosquito, responsible for malaria in the human. A peculiarity of this mosquito is its long, thin legs, and the dark spots on the wings are characteristic. The same general difference in the head-dress of the sexes obtains, save that the palpi are about equally long in both, as may be seen by comparing the pictures (Figs. 4 and 5).

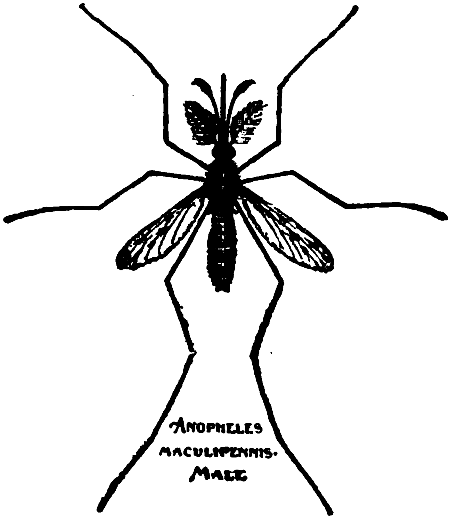


FIG. 4.

The *Stegomyia* is for the South by far the most important mosquito; not because it is most numerous, but because it is the natural conveyer of yellow fever. It has been called the tiger mosquito because of its striped appearance. It is a most beautifully marked mosquito and very dainty. It is essentially a domestic insect, and is found only in inhabited localities. It is a day mosquito, and, resting on a dark background, such as a black coat or dress, presents a par-

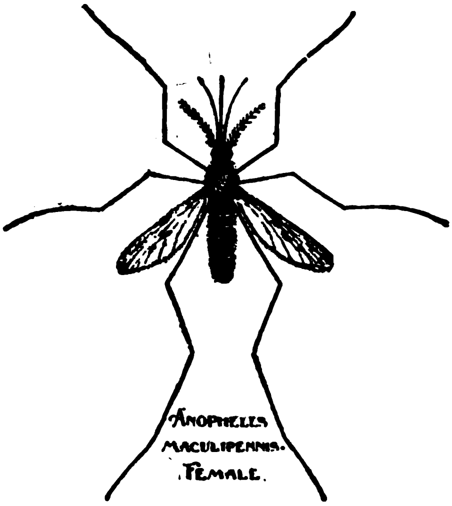


FIG. 5.

ticularly striking appearance, the white bands on the legs and the peculiar marking of the back easily distinguishing it from any other (Figs. 6 and 6A).

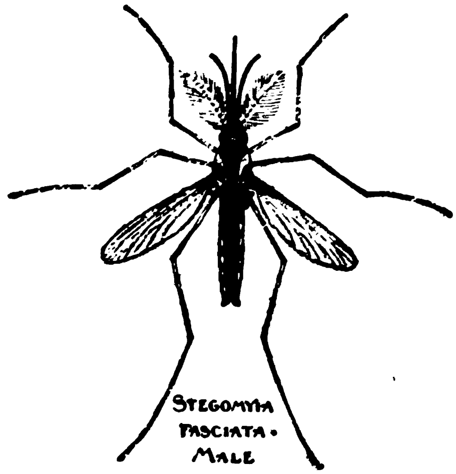


Fig. 6.

The antennæ of all male mosquitoes are more hairy than those of the female. Some of these hairs respond to sound by a vibratory motion; they are, therefore, auditory. These are the ears of the insect, and the male flies to the female guided by her song, adjusting the direction of his flight by turning his head until both antennæ are equally affected, when the object of his search is directly in front. The song of the insect is not produced solely by the buzzing of its wings, but also by the vibration of a peculiarly constructed chitinous process situated near the breathing apertures (which, by the way, are along the sides of the insect) and set in motion by respiration. This is the famous yellow fever mosquito, which has been the greatest and most persistent enemy the South has ever had, costing many thousands of lives and many millions of dollars, but which is at last, happily, conquered, if we but use the weapons that have been put in our hands by the patient searchers for truth in the field of science.

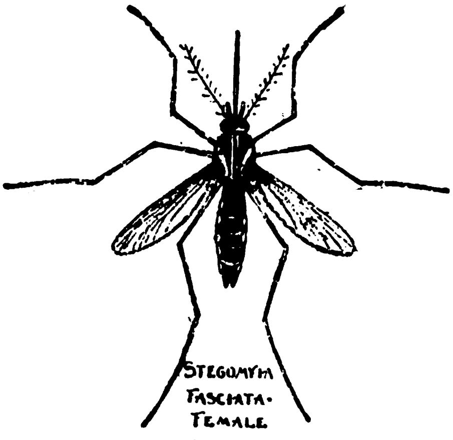


Fig. 6A.

Mosquitoes cling to surfaces as a cat clings to the bark of a tree. A mosquito cannot rest on a perfectly smooth perpendicular surface; a fly can. A fly's foot is a sucker; a mosquito's foot is a claw (Fig. 7). Mosquitoes resting upon window panes would seem to deny this, but a window pane, very shortly after a thorough cleaning, may collect enough moisture and dust to form a film over the glass sufficient, though invisible, to afford a firm hold for the insect.

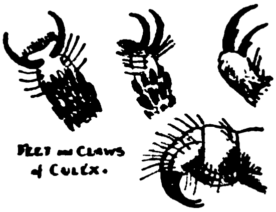
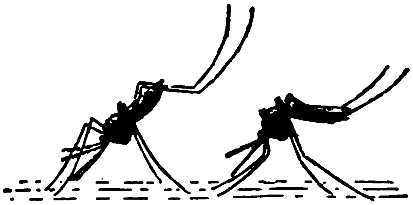


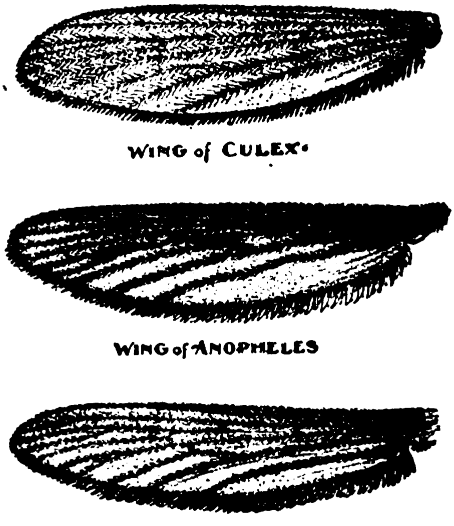
Fig. 7.



Resting Position of Anopheles, and of Culex and Stegomyia.

Fig. 8.

The resting position of *Anopheles* is peculiar in that the head, body, and tail present a straight line, at an angle with the resting surface, while in the *Culex* and *Stegomyia* the body is bent as you observe in Fig. 8.



Wing of Culex.

Wing of Anopheles

Wing of Stegomyia.

Fig. 9.

The wings of mosquitoes present important differences in their markings, which easily distinguish them from each other (Fig. 9).

The wing of *Culex* is not very different, except to the entomologist, from that of the *Stegomyia,* while that of *Anopheles* is spotted. The fringe of the insect's wing (not distinctly visible except under the microscope) is made up of the most beautifully arranged series of feather-like scales; each one, as well as the wing as a whole, reflecting the most brilliantly iridescent colors.

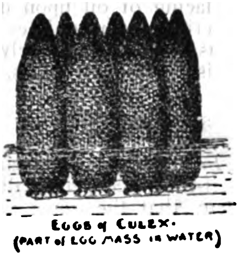

Eggs of Culex.
(Part of egg mass in water)

Fig. 10.

Having discussed the full-grown mosquito, let us next consider its origin and how it may be destroyed, and then why it should be destroyed:

The eggs of *C. pungens* (Fig. 10), the gutter mosquito, are cone-shaped, and float on end, being glued together in large masses to maintain this position in the water. The number deposited by a single mosquito varies from 50 to 400, and they hatch in from one to three days, varying according to temperature and environment. When a sufficient time has elapsed to complete the hatching process, the larva (Fig. 11) or wiggle-tail issues from the shell, and begins to feed on the vegetable and animal matter contained in the water.

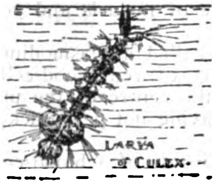

Larva of Culex.

Fig. 11.

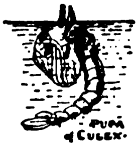

Pupa of Culex.

Fig. 12.

In its growth the larva sheds its skin several times before the pupal stage is reached — in from 7 to 10 days. Mosquito wigglers get along apparently without air, when the surface of the water is covered with ice, and it is possible that they get air then, in the same way that fish do. This would account for their not being destroyed by surface freezing of the water. Entomologists must decide whether or not the larvæ have gills or some organ analogous to the gills of the fish. The wigglers of some mosquitoes may be frozen in ice and hibernate until liberated by warmer weather.

The pupal stage in mosquito life corresponds to that of the chrysalis in the transition of a caterpillar into a butterfly (Fig. 12). The pupa does not feed. In about two days it becomes an imago, which is the technical name for the completed insect whose life begins with the ovum or egg.

The shell of the pupa breaks at its highest point, and the completed mosquito issues, being supported by the floating shell until its wings spread for flight (Fig. 13).

The kind of mosquito that issues from the shell of the pupa depends of course on the kind of egg which has been deposited and hatched in the water.

The life cycle of *Culex,* the gutter mosquito, is from 10 to 15 days. Do not mistake the life cycle for the length of life; mosquitoes may live as adult insects for many months, and some females must hibernate through the winter to furnish eggs for the next summer's supply.

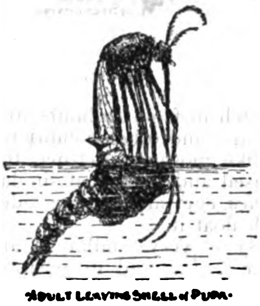

Adult leaving shell of Pupa.

Fig. 13.

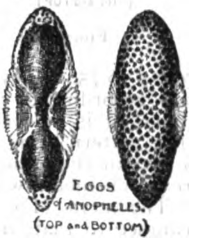


Fig. 14.

Eggs of *Anopheles* (Fig. 14), the swamp mosquito, are boat-shaped, and float singly on the surface of stagnant pools. They are deposited in numbers between 40 and 100. The bottom of the floating egg is marked somewhat like mosquito netting, the pattern being raised. The top of the egg is smooth, black in color, and partly covered by a transparent membrane, which stands out from the surface of the top and sides, permitting intervening spaces of air, which float the egg like a lifeboat. The egg hatches in from three to four days.

The larva of *Anopheles* (Fig. 15) may be readily distinguished by its position at the surface of the water, as well as by its general appearance, differing from that of either *Culex* or *Stegomyia.* You will observe that the neck of the *Anopheles* larva is very slender, and that the head is turned upon the body. This is because the *Anopheles* larva finds its food on the surface, and gathers it by the constant motion of little broom-like processes projecting from the sides of the mouth, and furnished for this purpose.

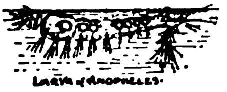

Larva of Anophells.

Fig. 15.

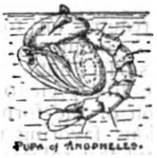

Pupa of Anophells.

Fig. 16.

The breathing tube, you will observe, projects from the back or upper surface of the larva, near the tail end. To get its mouth to the surface while maintaining its position for breathing, requires that the head should be turned half round on the body, an impossible position to any but the thin-necked *Anopheles* larva.

The larva becomes a pupa (Fig. 16) in about 12 days. In about five days the pupa is a full-grown mosquito.

Eggs of *Stegomyia* (Fig. 17), the yellow fever mosquito, float singly upon the surface of the water, and are deposited in numbers varying from 5 to 75. They hatch in from 10 hours to 3 days, according to climatic and other conditions. The shell is marked like mosquito netting, the white pattern being raised and somewhat similar to that of the *Anopheles* egg, and on the sides are air-chambers which float it.

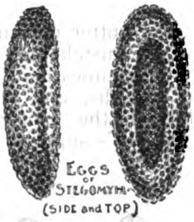


FIG. 17.

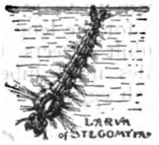


FIG. 18.

The larva (Fig. 18) is very similar in appearance to that of the *Culex*, and its position in the water is also similar to *Culex* and unlike *Anopheles.*

In about six days the pupa (Fig. 19) develops, and in a day or two the mosquito begins its flight.

The larvæ of all mosquitoes have a breathing-tube near the end of the tail, and the pupæ have a pair of breathing-tubes projecting from the body near the head.

The insect, both in the larval and the pupal stage, requires air, to obtain which the breathing-tubes at frequent intervals protrude from the water surface into the air above.

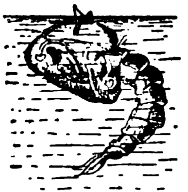


FIG. 19.

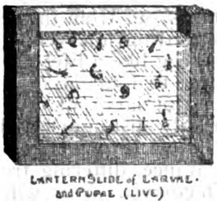

LANTERN SLIDE of LARVAE and PUPAE (LIVE)

FIG. 20.

The life cycle of mosquitoes varies, as to duration of the formative periods, according to conditions favoring rapid development; and no hard and fast rules can be laid down as absolute in this regard. It may be said, however, that the cistern mosquito breeds, approximately, in one week, the gutter mosquito in two weeks, and the swamp mosquito in three weeks.

Fig. 20 is that of a lantern slide as a glass tank partly filled with water, containing larvæ and pupæ of the *Culex* mosquito. The wiggle-tails, which are about a twelfth of an inch or so in size, are magnified to about 100 diameters on the screen.

Observe how both the larvæ and the pupæ rise to the surface to breathe. Some years ago it was claimed that permanganate of potash in water would kill wigglers, but it does not affect them, even in quantity enough to redden the water. Wigglers, however, die of suffocation when air is cut off by pouring oil on the water surface. It is estimated that about two tablespoonfuls of kerosene (ordinary illuminating oil) will spread and film the water surface of an average cistern, and the oil will positively not affect the potability or taste of drinking-water. The placing of oil upon drinking-water for the destruction of mosquitoes is not a new idea, for it was suggested as early as 1812, and has been practised for many years.

HOW MOSQUITOES TRANSMIT DISEASE.

Malarial Fever.—That malaria is a germ disease no well-informed person disputes. Even those who deny that the germ is conveyed by mosquitoes admit that it is found in the blood of its victims.

There are both animal and vegetable germs of disease. The germs of tuberculosis and diphtheria are vegetable; those of malaria and yellow fever are animal.

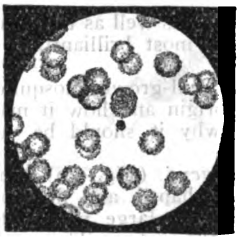


FIG. 21.

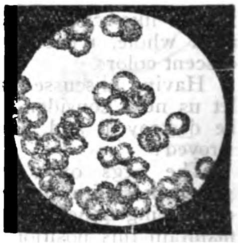


FIG. 22.

The malarial germ is called a plasmodium. Fig. 21 represents a group of red blood-cells, with a malarial germ in the centre of the picture. The germ is free, having not yet attacked a blood-cell.

Fig. 22 shows a germ inside of a blood-cell. The germ, once inside of the cell, multiplies as the cell contents are destroyed, and here we see a multiplication of germs by segmentation within the blood-cell.

The next step in germ growth is the bursting of the cell membrane and the liberation of the germs, which in turn seek new cells and go through the same process of multiplication and blood destruction, eventually causing malarial anæmia and the many other symptoms, acute and chronic, of this infection.

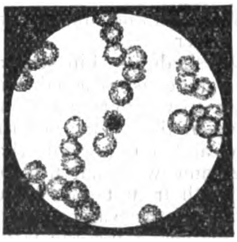


FIG. 23.

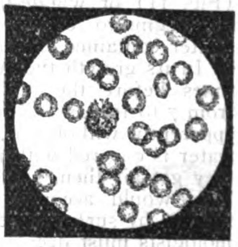


FIG. 24.

The discovery that malaria is conveyed by a certain kind of mosquito was not made in a day, and the belief in the correctness of the mosquito transmission of the disease does not depend on a superficial consideration only.

Each link in the chain of evidence has been carefully examined and the conclusion is firmly based on ascertained facts.

That malaria may be acquired in some other way is still held by some physicians, but these are growing fewer in number as the subject is further investigated.

The malaria germ in the human blood multiplies by segmentation, but, when drawn into a mosquito of the *Anopheles* variety, undergoes certain changes of character and form as a sexual animal. Under the microscope the changes have been observed and studied, and are now fairly well understood.

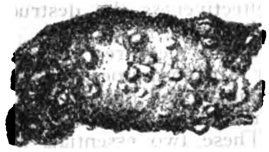


FIG. 25.

Some of the germs taken in with the blood are digested in the stomach of the insect, but others enter the stomach walls and break through.

Fig. 25 is a picture from a micro-photograph of a mosquito's stomach, showing the germs about to break through and get into the general system. The protuberances upon what would otherwise be a smooth surface are caused by the germs breaking through.

These germs make their way through the intervening tissues to the salivary glands of the insect, from which they are injected into the blood of the human victim, to again undergo asexual multiplication.

Fig. 26 is a diagram section of a mosquito, showing how the germs may be sucked in with the blood of a malarial subject, and how they may be introduced into the blood of another victim along with the saliva and poison, which mosquitoes inject for the purpose, it is thought, of rendering the blood thinner and more easily obtained.

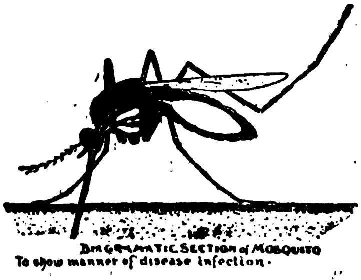

DIAGRAMMATIC SECTION of MOSQUITO
To show manner of disease infection.

FIG. 26.

The proofs that malaria is transmitted by the *Anopheles* mosquito are abundant and conclusive.

Yellow fever, like diphtheria, kills by toxin poisoning. Yellow fever never was conveyed by filth, and never depended on dirt; it always depends on the conveyance of the germ by the particular mosquito to which nature has given the peculiar characteristics required for its protection and conveyance. It takes five days for yellow fever to develop after infection.

Aside from microscopic findings in the blood of the mosquito, and of malarial patients, practical experimentation has been repeatedly appealed to for confirmation, and never without positive results. As an example of the kind of evidence obtained in this way may be cited the experiments in the Roman Campagna, where malarial infection is extensive and virulent. Here was constructed, in one of the most malarious portions of the swamp land, a small house, thoroughly wire-screened against mosquitoes. The house was occupied by a number of people whose movements were not restricted, save that they entered the house every evening at sundown and remained inside until daylight (the malaria mosquito bites at night). The supposedly dangerous night air was admitted freely, and during the rainy season the experimenters purposely got soaked to the skin. None, however, contracted malaria, while their neighbors, who were not protected from mosquitoes, suffered severely.

Again: To prove that *Anopheles* are capable of transmitting malaria, infected mosquitoes were sent to London from Rome, and one of the insects was permitted to bite the subject of experiment. Symptoms of the disease followed the inoculation in due time, and a case of malaria occurred in a person who was not living in a malarious country, and had not visited a malarious region since childhood. The germs of malaria were transmitted, in a mosquito, from Rome to London.

Yellow Fever.—The method of infection in yellow fever is very similar to that of malarial infection; with important differences, however, as to details. The belief that the disease is conveyed by the female of the mosquito, known as the *Stegomyia fasciata*, also rests on experiments and observations, equally as conclusive as those relating to malaria and the *Anopheles.*

Dr. Carroll, one of the investigators for this government in Cuba, says: "Natural yellow fever is transmitted by the mosquito, and always and only by the mosquito." We may be sure that such a positive statement was not made until after the most searching investigation, carefully guarded against error.

According to the old belief, yellow fever was conveyed in much the same manner as scarlatina, diphtheria, and smallpox; that is, by personal contact or contact with articles infected by the sick. These infected articles are called fomites, and, with regard to yellow fever, this term included everything supposed to carry infection. Some quarantine authorities included in this class pig-iron and stone ballast from infected localities.

The government experiments in Cuba demonstrated the harmlessness of fomites by the placing of young American men for 20 consecutive nights in a room to sleep upon and under bedclothes soiled by previous use in the yellow fever hospital. The room was kept moist and warm, and garnished with articles taken from fatal cases of yellow fever. Contact was as intimate as possible with these supposedly infected articles; but mosquitoes were excluded, and no one got sick. Similar experiments were repeatedly made, with the same result. Subsequently, four out of seven persons experimented upon were infected by means of the mosquito. A room was prepared to exclude all possibility of infection by fomites, and infection by mosquitoes promptly followed inoculation.

Yellow fever is conveyed by the *S. fasciata* mosquito, but the germs of the disease may be taken by the mosquito only during the first three or four days of the fever; after that time the blood of the patient cannot infect the mosquito. The germs require about 12 days to migrate from the stomach of the insect to the salivary glands, from which they may be injected through the mosquito's biting organ into the human blood stream. Mosquitoes, after becoming infectious, are capable of inoculating the disease into the human at intervals of three days (period of feeding) for practically an indefinite time.

The adaptation of protective measures to this important discovery renders the prevention or suppression of an epidemic very simple, theoretically. Screening the patient from mosquitoes during the first four days of fever (before the diagnosis), or killing all mosquitoes in the room before the twelfth day after their possible infection, will certainly prevent a second case. It is seldom possible in practice, however, to attain the high degree of perfection which theory so often demands.

It is practically impossible to screen from mosquitoes every case of fever that might be yellow fever, and it is impossible, also, to be certain of the destruction of all mosquitoes that may have been infected from mild and unrecognized cases of the disease.

The destruction of all mosquitoes in vehicles of transportation — for freight as well as passengers — from possibly infected localities, is far more likely to be complete and effective; and the extermination of the *Stegomyia* mosquitoes in infectible localities would be much easier and less costly than the screening of all fever cases, and the destruction of all mosquitoes possibly infected therefrom.

Dr. Stanford E. Chaillé, of New Orleans, in a clear and logically convincing presentation of the subject to a meeting of the American Medical Association, concludes that «Boards of health, should they neglect any practicable measure of warfare against the *Stegomyia,* would deserve the severest punishment of the worst criminals.»

For the permanent eradication of the mosquito plague, the commencement has been made in New Orleans by the construction of drainage and sewerage systems. The total abolition of cisterns will, no doubt, follow as soon as the city is furnished with the necessary supply of good and pure water by means of an efficient waterworks system.

The fear of yellow fever and the desire to prevent its recurrence brought about the inauguration of the New Orleans Sewerage and Water Board in 1899, and a tax levy of about $14,000,000. The mosquito transmission of yellow fever has since been recognized, and it is now known that, to prevent yellow fever, the destruction of mosquitoes is far more important than the getting rid of filth, and that the Sewerage and Water Board, whatever else it accomplishes, will not begin to effect the determining purpose of its inauguration — protection against yellow fever — until it furnishes a good water supply, thereby permitting the destruction of cisterns, which are known to be breeding places for the *Stegomyia* mosquito, and which should be screened, therefore, until they can be abolished in favor of a municipal water supply system furnishing potable water.

It is estimated that about 75,000 of these cisterns exist in New Orleans, and very few are screened. Meanwhile, until cisterns are destroyed or screened, quarantine must be depended upon. Quarantine, though, will never equal in effectiveness the destruction of mosquitoes in infectible localities.

In quarantine measures against yellow fever, destruction of mosquitoes is exceedingly important, being second only to the detention, for five days after exposure, of those who are not immune. These two essentials are indeed the only effective quarantine measures against the disease; all else is useless and unnecessary.

Quitman Kohnke, M.D.,
Health Officer, New Orleans, La.

Mosquito Fleet, in the navy, a term given to what is known as «the second line of defense,» which is used in protecting the fortifications and harbors along the coast line, and, like the insect for which it is named, annoys the enemy in every way, at the same time preventing the possibility of a blockade. A fleet of this kind was organized during the Spanish-American War in 1898, and was composed of all sorts and kinds of ships to the number of about 130.

Mosquito Lagoon, Fla., a salt water lagoon on the east coast 30 miles long by one mile wide, separated by a sandy strip of land, half a mile to five miles wide, from the ocean, and connecting with the latter by Mosquito Inlet and Haulover Canal. It connects also on the north with Halifax River and on the south with Indian River. Fish and oysters are plentiful in its shallow waters, but mangrove swamps, sand and coral banks obstruct navigation even by the smallest boats.

Moss, Frank, American lawyer: b. Cold Spring, N. Y., 16 March 1860. He was educated in the public schools and in the College of the City of New York. In 1897 he was president of the board of police in New York and was counsel to the «Lexow Investigating Committee.» In 1899 he was leading counsel for the «Mazet Investigating Committee,» has since been connected with the Society for the Prevention of Crime and is professor of medical jurisprudence in the New York College and Hospital for Women. He is the author of 'The American Metropolis' (3 vols. 1897).

Moss, Lemuel, American Baptist clergyman: b. Boone County, Ky., 27 Dec. 1829; d. New York 12 July 1904. He was graduated from the University of Rochester in 1858, and became pastor of the First Baptist Church of Worcester, Mass., in 1860 and thereafter held various important charges. He was president of the University of Chicago in 1874–5, and of the University of Indiana in 1875–84. He has been connected with various educational societies and was president of the American Baptist Historical Society in 1895–1900. He has published: ‘Annals of United States Christian Commission’ (1866); ‘A Day with Paul’; etc.

Moss-animals, or **Bryozoa.** See POLYZOA.

Moss-bunker, a common name about New York for the menhaden (q.v.). It is one of many forms of the Dutch name “marsbanker” for the scad, ignorantly applied by the early Hollanders, and has been misspelled and mispronounced in a great variety of ways. A detailed account of this matter will be found in Goode's ‘Fishery Industries of the United States,’ Sec. I (1884) as a part of the history of the menhaden.

Moss-pink. See PINKS.

Mosses (*Musci*), a class of cryptogamous plants, forming with the liverworts (*Hepaticæ*) the group *Muscineæ* or *Bryophyta.* The only plants likely to be wrongly called mosses are the foliose liverworts, and these are readily distinguished by their two-ranked nerveless leaves, their four-valved capsule, and certain other characters. A germinating moss spore gives rise to a filamentous body called a *protonema,* from which buds arise and develop into the leafy shoots which constitute the true moss-plants. After a time the reproductive bodies are formed at the tips of certain shoots. The *antheridia,* or male reproductive organs, are club-shaped, and contain cells which afterward develop into the *antherozoids.* These antherozoids, when liberated from the antheridium, move about until they come in contact with an *archegonium,* or female reproductive body. The fertilized archegonium is then carried upward on a slender filament or *seta,* and now forms the fruit or *capsule,* usually closed by a lid or *operculum,* and often covered by a sort of hood called a *calyptra.* When ripe the capsule opens and liberates the spores, which by germination begin the life-history again. Mosses may also reproduce themselves asexually by the formation of buds or *gemmæ.* There are no true roots in mosses, and the leaves are of very simple structure. New ones are continually springing from old shoots, so that in bogs the top remains growing while the underlayers die and the deeper ones slowly change into peat. Some five thousand species of mosses are known, of which about nine tenths belong to the order *Bryaceæ.* This order comprises the two sub-orders, *Cleistocarpæ,* with an indehiscent capsule, including the genera *Phascum, Ephemerum,* etc.; and *Stegocarpæ,* in which the capsule opens by a lid. The stegocarpous mosses, again, may have the capsule either terminal (*Acrocarpæ*) or lateral (*Pleurocarpæ*), the former group including, among others, the genera *Grimmia, Fissidens, Polytrichum, Orthotrichum, Dicranum, Mnium, Bryum,* and *Funaria,* and the latter, *Hypnum, Leskea,* and *Climacium.* There are three other orders of mosses, namely, *Sphagnaceæ,* or Bog-mosses, with only one genus, *Sphagnum; Andreæaceæ,* with the single genus *Andreæca;* and *Archidiaceæ,* with the genus *Archidium.* Mosses are of little or no economic value, but they form an important part of the natural covering of rocks, and serve to prepare the way for higher forms of plants. Consult Strasburger, ‘Text-book of Botany’ (1903).

Mosses from an Old Manse, title of Nathaniel Hawthorne's second collection of tales and sketches (1854). The Old Manse, Hawthorne's Concord home, is described in the opening chapter of the book. The remaining contents include many of Hawthorne's most famous short sketches, such as ‘The Birth-Mark,’ ‘Roger Malvin's Burial,’ and ‘The Artist of the Beautiful.’ These bear witness to his love of the mysterious and the unusual; and their action passes in a world of unreality, which the genius of the author makes more visible than the world of sense.

Most, mōst, **Johann Joseph,** German-American anarchist: b. Augsburg, Bavaria, 5 Feb. 1846. He learned bookbinding and traveled about the continent in pursuit of his trade. Later he was editor of the *Freie Presse* at Berlin, and in 1874–8 member for Chemnitz in the Reichstag. Expelled from the Socialist ranks in Germany, he went to London, where he founded *Die Freiheit,* an anarchistic sheet, in 1879. In 1881 he was arrested and sentenced to 18 months' imprisonment; and upon his release came to the United States. He continued *Die Freiheit* in New York. In 1901 he was arrested for a seditious editorial in his journal, and sentenced to a year's imprisonment, commencing June 1902. He published several anarchistical writings, such as ‘Why I Am a Communist’ (1890), and ‘Down With the Anarchists’ (1901).

Mosul, mō'sool, Asiatic Turkey, capital of a vilayet and sanjak of the same name, on the right bank of the Tigris, 220 miles northwest of Bagdad. A stone bridge continued by a bridge of boats crosses the river to the site of ancient Nineveh. The town is surrounded by decayed walls, and has houses of stone and brick, mosques, shrines, Christian churches, convents, etc. Formerly a place of much commercial importance, it has greatly declined, but it still carries on some trade, especially in gall-nuts. Muslin is named from this town. Population about 61,000, mostly Mohammedans, but including many Christians and Jews.

Moszkowski, mŏsh-kŏf'skē, **Moritz,** Polish composer and pianist: b. Breslau 23 Aug. 1854. At 19 he began to appear in public after studying at Dresden and Berlin. His success was immediate and striking and he made frequent concert tours. He is a talented composer; his opera ‘Boabdil’ was presented at Berlin in 1892; his other works include a ballet, ‘Laurin’; a symphonic poem, ‘Jeanne d' Arc’; some ‘Danses espagnoles’ for the piano or violin; and the two orchestral series called ‘Les Nations.’

Mota-Padilla, mō'tä pä-dēl'yä, **Matias de la,** Mexican historian: b. Guadalajara, Mexico, 6 Oct. 1688; d. 1766. He was a lawyer, and during the latter part of his life a priest. He wrote among other works, ‘History of the Conquest of New Galicia’ (1870–1).

Motet', or **Motett,** a vocal composition in harmony, set to words generally selected from sacred writings. Like the madrigal, the motet was a first set to words of a profane character, and there are ecclesiastical decrees extant forbidding its use in church.

Moth, any insect of the order *Lepidoptera* not included among the butterflies (q.v.). Moths have antennæ of many forms, and on account of this variability are often grouped in a section *Heterocera*, but their antennæ are rarely swollen at the end, or "clubbed," and never in the North American forms. They are farther distinguished from butterflies by their wings being horizontal when at rest, and by their being seldom seen on the wing except in the evening or at night, although certain species of moth fly in the brightest sunshine, and some butterflies appear at twilight. In most cases there is a peculiar arrangement of interlocking spines (frenulum and retinaculum) by which the hind wings are kept in contact with the front wings during flight. The pupæ are never angular; are mostly smooth and dark-colored; and are often enclosed in a cocoon, which the larva spins before it passes into the pupal stage. Moths are comparatively larger than butterflies and more hairy or downy in character. A Brazilian giant measures nearly a foot from tip to tip, and there is a gilded species smaller than a pin's head. Similarly they present as great a variety of outlines and as much beauty (with less gaudiness) as do the butterflies; and they interest the philosophical naturalist by the extraordinary adaptations to conditions which many of them present, and which have come about in the development of the race. Some of the most extraordinary examples of sexual dimorphism, of protective coloration (q.v.) and resemblance, of mimicry (q.v.) and of curious armaments, are to be found among these creatures, whose small size, weakness, and edibility, especially when in the larval condition, render essential means of concealment and of passive defense. Nevertheless caterpillars of moths, as well as of butterflies, furnish a large part of the food of birds and of various other insect-eating animals; and in the adult state they are seized by night-flying birds, by lizards, monkeys, turtles, and by some predatory insects and spiders. The eggs of moths are laid upon the proper food-plant of the species, and are various in form, ranging from that of a sphere or a cylinder to that of a disk, often with the surface beautifully sculptured or ornamented. Each has a micropyle, or lidded opening from which the larva escapes. They are laid by most species of temperate regions in the early summer, and the life-cycle of the insect is completed before the end of the season; but some moths oviposit in the autumn, when their eggs remain quiescent through the winter, or, in some cases, hatch in time for the larva to partly grow, then hibernate and complete their development the following spring.

The larvæ or caterpillars of moths, like those of butterflies, hatch as very minute objects, but rapidly grow, shedding their skins (see MOLTING) at intervals to permit of enlargement, until some attain a length of six or seven inches. Most moth-larvæ molt five times, but some oftener and a few less times.

The larval condition is the insect's period of feeding and growth, some species taking no food whatever in adult life. The vast majority feed upon green vegetable food, leaves most of all; and are among the worst foes of our parks, orchards and gardens, attacking cultivated plants in a great variety of ways. "A few larvæ," remarks Holland, "feed upon woody tissues, and bore long galleries under the bark or in the wood of trees." Others feed upon the pith of herbaceous plants. A number of species feed upon the inside of growing fruits. Only a very few species are known to be carnivorous. The household moths (*Tineæ*) are well known on account of the injury they work among clothes, carpets, furs, etc. Other species attack grain, meal, flour, hay, tobacco, dried herbs, drugs, and a variety of stored products; others bore into timber, or damage human property in some other way. Some recompense is obtained, however, from the silkworms (q.v.), the young moths whose cocoons furnish silk.

There is considerable variety in the form of the caterpillars of moths, but most are worm-like, and the structure and appendages resemble those of butterfly caterpillars (q.v.). The great majority possess besides the six minute thoracic legs the usual four pairs of "prolegs," or false feet, in the middle of the body, and a fifth pair on the hindermost (13th) segment (somite) of the body, which in reality are clasping organs needed for clinging to twigs in the process of molting. In some (numerous geometrids, noctuids, and psychids) these prolegs are reduced in number, and in the geometrids they are placed in only two pairs on the 9th and 13th segments, and these larvæ can progress only by looping the body upward (see MEASURING-WORMS). Other variations of this feature exist, as the sucker-like pads of the *Megalopygidæ* and *Cochlidiidæ*.

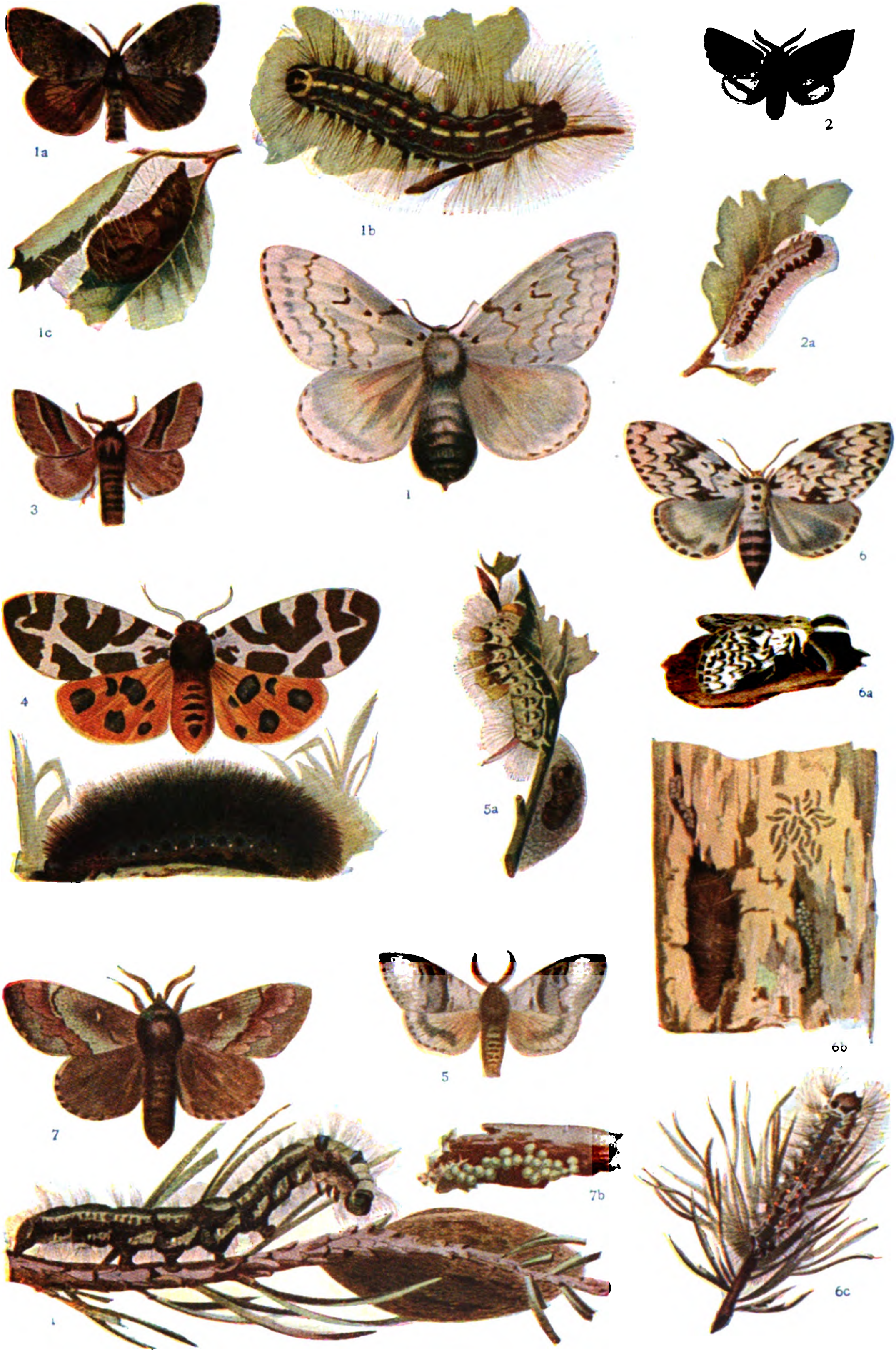
"The bodies of the larvæ of moths," to quote Holland, "are covered with tubercles, the location and arrangement of which have in recent years received considerable attention from students, and are thought to furnish a clue to the lines of descent of certain families. These tubercles sometimes carry only a single hair, in other cases they carry large tufts of hairs; they may be small and inconspicuous, or they may be developed until they assume the form of great spines, horns, or bulbous projections."

Some moth caterpillars exhibit bright and beautiful colors, and move about fearlessly, protected by thorny projections, or nauseous exudations, or by hairs which possess severe stinging properties. Others present striking examples of protective resemblance and mimicry, in color or form or attitudes, or all three respects. While many are solitary in their habits others are gregarious, forming "armies" and "processions" during their feeding life which disperse when the time for pupation arrives.

Many moth-larvæ enter the ground and surround themselves with an earthen cell in which to transform into and pass the pupal stage. Others spin cocoons in great variety, usually formed more or less of silk, and well protected against both the weather and enemies. Some are hidden away under leaves, beneath loose bark, in the crevices of rocks or old stumps, or fastened to the branches of trees. As a rule the cocoons are whitish or brown in color, never ornamented with the bright silvery or golden spots characteristic of the chrysalids of many butterflies. Escape from the tough silken kind of cocoons is aided by a copious saliva which dissolves or cuts the silk, so that the newly born insect many wriggle out.

The anatomy of the moths is substantially the same as that of butterflies, but in these

MOTHS DESTRUCTIVE TO FOLIAGE



1. Gypsy Moth (Porthetria dispar), female; *a*, male; *b*, feeding caterpillar; *c*, pupa. 2. European Processionary Moth; *a*, feeding caterpillar. 3. Lackey Moth. 4. Tiger Moth and its "woolly bear" caterpillar. 5. Tussock Moth; *a*, caterpillar and cocoon with pupa. 6. Psilura Moth (Psilura monacha), female; *a*, male; *b*, eggs, young caterpillars and pupa, on the under side of a piece of bark; *c*, feeding caterpillar. 7. Pine Moth (Gastropacha), female; *a*, feeding caterpillar and cocoon; *b*, eggs.

Univ. Library, UC Santa Cruz 2001

heterocerous families the head is not so prominent. The eyes, however, are often larger and better, as would be expected of insects mainly crepuscular in their habits; and some have the suctorial apparatus in high perfection, so that many of the hawk-moths and noctuids can poise upon whirring wings, and inserting the long proboscis suck nectar from flowers without alighting; and these take a considerable part in the cross-fertilization of plants. On the other hand, in the bombycine moths and their allies, the proboscis is small and some of them have no mouth-parts or ability to feed at all. "They are simply animate winged reservoirs of reproductive energy, and, when the sexual functions have been completed, they die."

The antennæ of moths assume a great variety of forms. They may be simple or branched, thread-like, fusiform, spatulate or like broad feathers; and those of the males frequently differ from those of the females. In an attempt at classification various subdivisions have been proposed, but lepidopterists no longer make artificial groupings of the families, whose interrelationships seem very uncertain. Most of the families, of which about 50 are recognized by modern systematists, are represented in America, but several families are confined to the Oriental regions, and a few are exclusively African. The criteria principally used in separating families are found in the character and arrangement of tubercles, and in the structure of the wings. The lowest are the very small moths called *Micropterygidæ,* with bronzy golden wings, whose larvæ show striking affinities with the caddis flies, and feed in damp moss. The large yellowish-brown "swift" moths (*Hepialidæ*) come next, whose larvæ and incomplete pupæ live underground and feed on roots; followed by the *Zygænidæ* or burnet moths, which are small day-flying insects adorned with bright metallic colors. Their larvæ feed openly on various plants, and spin elongated cocoons. The tropical *Chalcosiidæ* and *Limacodiidæ* are allied to them; also the large, day-flying, brilliant tropical castniids, which have clubbed antemnæ like butterflies. The small family *Megalopygidæ,* of hairy American moths, are singular in having seven pairs of prolegs. The *Psychidæ* are a small but universally distributed family characterized by the extreme degradation of the wingless females; the caterpillars live in portable cases made of sticks, grass, etc., and are called "basket worms" (q.v.). The *Cossidæ* are large moths, unable to feed, most numerous in the tropics and exemplified in Europe by the well known gnat and leopard moths (qq.v.); only two species are North American; and the *Sesiidæ* are the clearwings (q.v.), resembling wasps. In the *Tortricidæ* is found a very large assemblage of small species known as leaf-rollers (q.v.), plentiful in the United States and embracing many pests, as the codling moth, etc. Another immense family of evil repute is the *Tineidæ,* represented by the clothes-moth, flour-moths (qq.v.) and the like, which damage woolen goods, furs and stored products of every kind, as well as feed upon plants, some of them performing an essential work in cross-fertilization, conspicuously the yucca-moths (q.v.); there are thousands of species. The plume-moths (q.v.) come next, followed by a series of families having obtect pupæ, which never emerge from the cocoon until the final molt. Among these are the *Pyralidæ,* a huge and varied family, having nearly 800 beautifully marked species in the United States alone, and largely destructive to cultivated plants. Representatives are the grape-leaf-folder, print-moth, sugar-beet moth, clover-hay worm, snout-moths, grass-moths, corn-stalk borer, bee-moth, leaf-crumplers, dried-current moth, and others, many of which are elsewhere described in this work. The egger-moths, tussock-moths (qq.v.) and some minor families are nearly related to the pyralids. The gayly colored tiger-moths (q.v.) carry the list to the owlet-moths (q.v.), which belong to the cosmopolitan nocturnal group *Noctuidæ,* and these are followed by several families, chiefly belonging to the Old World. Then come the *Sphingidæ* (see DEATH'S-HEAD and HAWK-MOTH), familiar all over the world; and the great assemblage of small, plainly but exquisitely colored geometrids (see MEASURING-WORM). Closely related are the tropical *Uraniidæ,* which contain large and magnificent green and gold tropical species — the glory of the forests of Brazil and the East Indies. Many of these, as of the Oriental family *Epicopiidæ,* are "tailed" and simulate the papilionid butterflies in many ways. Next to these are placed the silk-worm moths (*Bombycidæ*), and several families of large tropical moths, leading up to the great Saturnians (*Saturniidæ*), scattered over most of the warmer parts of the world; among them is the great *Attacus atlas* of India, the largest of all *Lepidoptera,* and many of the largest, and most notable of American cocoon-making species, such as the Ailanthus silk-moth, the Cecropia, Polyphemus, Luna, and several others well known and elsewhere described.

The literature relating to moths is very extensive. The most complete and scientific account of the families, technically considered, is found in Hamson's 'Catalogue' of the moths of the world, published since 1898 by the British Museum. The Smithsonian Institution published simultaneously a 'List' of North American species by H. G. Dyar. The text-books of Packard and Comstock give sufficiently full accounts of structure; and Carpenter's 'Insects and their Structure' (1899), and Sharp's 'Insects' (Vols. I. and II., of Cambridge Natural History) (1895-9), contains a resumé of general information and of modern views as to relationships, phylogeny, etc. The best general illustrated descriptive work on North American species is W. J. Holland's 'The Moth Book' (New York, 1903), which contains an extensive classified list of books relating to the whole subject, including the splendid monographs of American families by Packard, Grote, Smith, Beutenmüller, Hulst, Dyar, and others.

Moth, Brown-tailed, a moth (*Euproctis chrysorrhoa*) of the family *Liparidæ,* accidentally imported from Europe, and nearly related to the gypsy and tussock moths. Its color is tawny brown, deepening toward the end of the body. The caterpillars defoliate trees, and have done much local damage in the neighborhood of Boston, as well as become an annoyance by their flying hairs which irritate the skin; but the insect is not so much feared as is the gypsy moth. This moth lays in midsummer about 250 eggs underneath the tip of a leaf, and covers them with its hairs. The larvæ appear after about a fortnight, and begin to eat the green substance of leaves, skeletonizing them; they also feed on apples and pears. In mid-autumn they form cases of bits of leaves, attach them to twigs by silken strands, pass the winter in them, complete their growth the following spring, feeding on foliage, flowers, and fruit, and then pupate in June, and emerge in midsummer.

Mother Ann. See Lee, Ann; Shakers.

Mother Carey's Chicken, any of several small oceanic petrels (q.v.); specifically, in the Mediterranean and Atlantic, the storm-petrel (*Procellaria pelagica*) often seen about ships, especially in wild weather, and looked upon with superstitious dread by sailors. Its manner of paddling along the surface of the waves suggested the name petrel, namely, little Peter (the Apostle), afterward transferred to the whole group; and the «Mother Carey» is supposed to be a queer Anglicization of the Italian sailor's prayerful exclamation: «*Maria Cara!*» (Dear Mother Mary), when he saw the birds hovering about the ship portending a gale and possible disaster. These little petrels are about six inches long, sooty black, with white rumps and a little white on the wings. They breed numerously on all northern coasts, as about Newfoundland, Labrador, North Greenland, and the British Isles, wherever suitable places can be found, occupying holes in the face of earth banks, like bank-swallows, and rarely approaching or leaving their nests, each with a single white egg, except at night.

Mother of Cities, the euphemistic local title for Balkh (q.v.), Central Asia.

Mother Goose's Melodies, the well-known collection of nursery rhymes. In 1860 a story was started to the effect that «Mother Goose» was a Boston woman; and she was identified as Elizabeth Goose, widow of Isaac Vergoose, or Goose, and mother-in-law of Thomas Fleet, a Boston printer, who issued a collection of the 'Melodies' in 1719. It is now conceded that «Mother Goose» belongs to French folk-lore and not to English tradition. Charles Perrault (q.v.), b. Paris 1628, was the first person to collect, reduce to writing, and publish the 'Contes de Ma Mère l'Oye,' or 'Tales of Mother Goose,' though he did not originate the name; and there is no reason to think that «Mother Goose» was a term ever used in English literature until it was translated from the French equivalent, «Mère l'Oye.»

Mother-of-Pearl. See Pearl.

Mother of Presidents, in American history, a name given to Virginia because that State has given six chief executives to the Union, namely: Washington, Jefferson, Madison, Monroe, Harrison, and Tyler.

Mother of States, in American history, a name given to Virginia, from the fact that out of the original Colony of Virginia were formed the States of Kentucky, Ohio, Indiana, Illinois, and West Virginia.

Mothers' Clubs, organizations of women in various American cities designed to better the condition of the home, and aiming to formulate improved methods for the moral training and education of children. The most prominent of these societies is the New York Mothers' Club. There is a New York State confederation of these societies which holds annual meetings.

Motherwell, mŭth'ėr-wĕl, **William,** Scottish poet and antiquary: b. Glasgow 13 Oct. 1797; d. there 1 Nov. 1835. Educated at Edinburgh and Paisley, at 15 he was apprenticed to the sheriff-clerk of the latter town, and in 1819–29 was sheriff-clerk depute. It was while in this situation that he did his best work both as poet and ballad-collector. After editing the collection of songs called the 'Harp of Renfrewshire' (1819), he compiled the more important collection of ballads published in 1827, under the title of 'Minstrelsy: Ancient and Modern,' with a historical introduction and notes. He became editor first of the Paisley 'Advertiser' (1828-30) and then (1830) of the Glasgow 'Courier.' He published in 1832 original 'Poems: Narrative and Lyrical.' Some of his lyrics are familiar in anthologies.

Motherwell, Scotland, a town in the county of Lanark, 12 miles southeast of Glasgow. It is of comparatively recent origin, and takes its name from three farms called High, Low, and North Motherwell, which again derived their names from an adjoining spring, which in Roman Catholic times was dedicated to the Virgin Mary, and called the *Well of our Lady,* or *Mother's-Well.* The inhabitants are chiefly employed in the neighboring coal-mines, iron and steel works, foundries and engineering shops. Motherwell has some good churches, a town-hall, public park, good water supply, electric light, etc.

Moth'erwort, a labiate plant (*Leonurus cardiaca*) with rigid branched stem 3 feet high, flowers in crowded whorls, white with a reddish, tinge, upper lip of corolla shaggy, calyx with pungent spreading teeth; leaves petiolate, lower ones palmately cleft, upper ones three-lobed. The plant, with two or three related species, frequents waste places, and is not uncommon in North America, where it has been introduced from Europe. An infusion of it was formerly much employed in chest diseases.

Motif, mō-tēf'. See Leitmotiv.

Motion. See Mechanics.

Motley, mŏt'lĭ, **John Lothrop,** American historian: b. Dorchester, Mass., 15 April 1814; d. near Dorchester, England, 29 May 1877. His education was obtained at Harvard, from which he was graduated in 1831, and at the universities of Berlin and Göttingen, between which he divided two years (1832–3). His first published writings were contributions to Willis' 'American Monthly Magazine,' and «verses in the corner of a paper called the 'Anti-Masonic Mirror.'» His first book, the two-volume, semi-autobiographical 'Morton's Hope' (1839), met with a generally unsatisfactory reception; and, according to Holmes, the 'North American Review' «dropped a small-print extinguisher upon it.» He went to St. Petersburg in the autumn of 1841 as secretary to the American legation, but after a brief residence returned (1842). His first important attempt in history was a 50-page article, nominally a review but really a narrative, on Peter the Great, in the 'North American' for October 1845 (in book-form in the

FOLIAGE-EATING MOTHS

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1. Pepper Moth, with larva and pupa.
2. Red Underwing, with caterpillar.
3. Pine Moths, with caterpillar.
4. Group of Geometrid Moths.
5. Currant-worm Moth (Abraxas).
6. Gipsy-moth, illustrating development.
7. Black Arches Moth, in various stages

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‹Half-Hour› library). His further literary work during this period includes notable essays on Balzac (July 1847) and the ‹Policy of the Puritans› (October 1849) in the ‹North American›; and a second effort of fiction, ‹Merry Mount› (1849), certainly an advance on the first, and rewarded by a nearly 20-page notice in the ‹North American,› but clearly not a success. But so early as 1846 he had been gathering material for a history of Holland. Having learned that Prescott, then at the height of his reputation, was busy upon the ‹History of Philip II.,› Motley had a conference with Prescott, who urged him to continue, even though the two works would unavoidably cover the same ground. For the year 1849 he was a member of the Massachusetts house of representatives; and he often humorously referred to his experience when an extensive and, as he fancied, impregnable report prepared by him as chairman of the committee on education was triumphantly demolished by George S. Boutwell (q.v.), then a young representative from Groton. From 1851 until 1856, the year of the appearance of the ‹Rise of the Dutch Republic,› he was in Europe, continuing his investigations at Berlin, Dresden, The Hague, and Brussels. When, after ten years' labor, the great work was at last ready for the press, it had to be published at the author's expense. It was received with almost universal praise by public and critics — Froude writing, «one of the earliest as well as one of the most important recognitions» — and definitely established Motley's fame. It was widely translated, Guizot superintending the French version and writing the introduction. Motley was in America in 1856–8, but then returned to Europe. In 1861 he wrote two letters, then of great timeliness and importance, to the London *Times,* setting forth to the English nation the structure of the United States government, the causes of the Civil War, and the results involved. From 1861 until his resignation in 1867 he was United States minister to Austria, and his official despatches in this post were highly praised by John Jay, his successor. He returned to the United States in 1868, in 1869 was appointed minister to England by Grant, but in 1870 was suddenly recalled. This action by the government was never explained with any degree of satisfaction. The correspondence between Motley and Fish, secretary of state, is to be found in a publication of the State Department (1871). It would appear that Holmes' verdict that Motley was greatly wronged is the correct one. Sumner said: «How little Mr. Motley merited anything but respect and courtesy from the secretary is attested by all who know his eminent position in London and the service he rendered to his country.» Motley continued writing until 1873, and in 1875 paid a visit to the United States. His other two famous works are the ‹History of the United Netherlands, from the Death of William the Silent to the Twelve Years' Truce, 1609› (1860), and ‹The Life and Death of John of Barneveld, Advocate of Holland: with a View of the Primary Causes of the Thirty Years' War› (1874). They confirmed his rank as a great historian, some of the best Dutch critics thought the ‹Barneveld› his chief publication. His style is precise and brilliant; his narratives are full of movement, his portraitures vivid. Consult Holmes (O. W.), ‹John Lothrop Motley: A Memoir› (1878).

Mot'mot, a bird of the tropical American family *Momotidæ,* allied to the kingfishers and todies, of which about 15 species are known, all in the genus *Momotus.* They inhabit the forests, as a rule, and are usually solitary in the daytime, perching with the head drawn between the shoulders, solemn and still except for an occasional melancholy croak from the repetition of which they derive their name, originally French and pronounced *mo-mo.* They are most lively at early morning and in the dusk of evening, pursuing insects in short flights; they also eat fruits, lizards, and snakes, which are tossed into the air from the point of the bill and swallowed; they sometimes devour the eggs of other birds. The nest is made in holes of trees or banks of earth. The motmots are birds of brilliant plumage, with one striking peculiarity. The two middle feathers of the long-tail are much prolonged, and are always more or less denuded of vanes on both sides of the shaft except near the tip, giving a racket-like shape to the feathers. This seems to be the result of a habit in the bird of gnawing its feathers, which begins as soon as their growth outreaches the other rectrices. The best known species is the Brazilian motmot (*M. brasiliensis*), about the size of a blackbird, of a deep rich green color, with bluish forehead, violet back of head, and black crown. One of the Mexican species (*M. cæruliceps*) occasionally crosses the line into the United States.

Motor, a machine for transforming natural energy in various forms into mechanical work, the term in the widest sense embracing wind-mills, water-wheels and turbines, steam-engines and steam-turbines, the various kinds of gas-engines, compressed-air motors, petroleum motors, electric motors, etc. Steam, hot-air, gas, and petroleum motors together constitute the group of *thermic motors,* because in all of them the source of energy is heat. See Dynamo.

Motor Area, that portion of the brain in which the cells that govern the voluntary muscles of the body are located. The motor area is confined more distinctly to the cortex, or outer surface of the brain on either side of the fissure of Rolando, making up the areas known as the anterior central and posterior central convolutions. In these areas are numerous motor cells, the destruction of which, or interference with the tracts of fibres that go from which, results in impaired function of the muscle corresponding to the cells or the fibres interfered with. The motor area in the right side of the brain controls the voluntary muscles of the left side of the body and the right hand and leg are controlled by the left side of the brain. The tracts of fibres that come from one side pass the middle line at the lower level of the medulla, the decussation of the pyramids. The motor area itself is subdivided into irregular areas, or centres, as they are loosely called — an arm-centre, a leg-centre, etc. In these more or less clearly delimited areas the cells governing the voluntary muscles of a leg or an arm are grouped. In much the same manner the nerves of the muscles of the face and of the eyes, tongue, etc., have their locations of origin in certain portions of this general motor area. Irritation of the motor area usually causes excessive muscular movements, or convulsions, and destruction results in loss of motor power or paralysis. See BRAIN; CONVULSIONS; PARALYSIS.

Motor System (OF ANIMALS). See ANATOMY, COMPARATIVE.

Motor Vehicles. The idea of moving vehicles by engine power is as old as the existence of engines. The last quarter of the 18th century and the first quarter of the 19th witnessed many attempts at utilizing the steam engine for the propulsion of vehicles on the highways, all of which eventually failed, chiefly by reason of the great weight at that time inseparable from steam plants. Steel was a costly hand-made product, rolling mills did not exist, tubes were formed from hammered sheet iron by welding or riveting, engine parts were forged and turned by hand work. Super-heating and compounding were unknown, the steaming capacity of boilers was low, and it was necessary to start the fire several hours before a departure could be made. For steamboats the weight and bulk were not an important objection; for locomotives drawing a train over iron rails the weight was even a necessity. Hence the steamboat and the railroad locomotive survived, while the steam car for common highways was laid aside, not to be resurrected till there was need for the heavy slow-moving agricultural traction engine and the steam roller.

With that movement the modern motor vehicle has practically nothing to do, except in so far as the steam engine of those days gradually called into existence new industrial factors without which the motor vehicle would still remain an impossibility. These factors were, mainly, the automatic machine tools which revolutionized manufacturing processes, advancement in the production of cored castings, the Bessemer process of steel making, the new art of drawing steel tubes from the ingot, the development of die work by which most metals, mild steel included, may be pressed or stamped cold into almost any shape, yielding like butter if the pressure is only strong enough and slow enough for the required formation. From these factors sprang the bicycle, and from the experience gained in the manufacture of bicycles in conjunction with another, almost entirely independent, factor the modern motor vehicle movement had its beginning. This independent factor was the invention of the gas engine by Lenoir, first publicly exhibited at the Paris Exposition in 1878 by Otto, and its adaptation to liquid fuel by Gottlieb Daimler and Karl Benz, 1885 and 1886. Apart herefrom, the so-called accumulator or electric storage battery had been discovered or invented in 1845, and had gradually been developed to serve industrial purposes.

Daimler's and Benz's work with gasoline engine bicycles, tricycles and four-wheeled vehicles, and the successes achieved with ordinary bicycles — the lightest vehicle produced — drew general attention to the changed conditions which now promised success also for a new type of steam vehicle and possibly for electric vehicles.

Henceforth an army of inventors and a smaller host of engineers turned their best efforts toward the solution of the various problems connected with the construction of one or another of the three types of motor vehicles, the automobile or gasoline motor vehicle, the steam vehicle and the electric storage battery vehicle. Nationality and local conditions and prejudices usually determined what type received their preference.

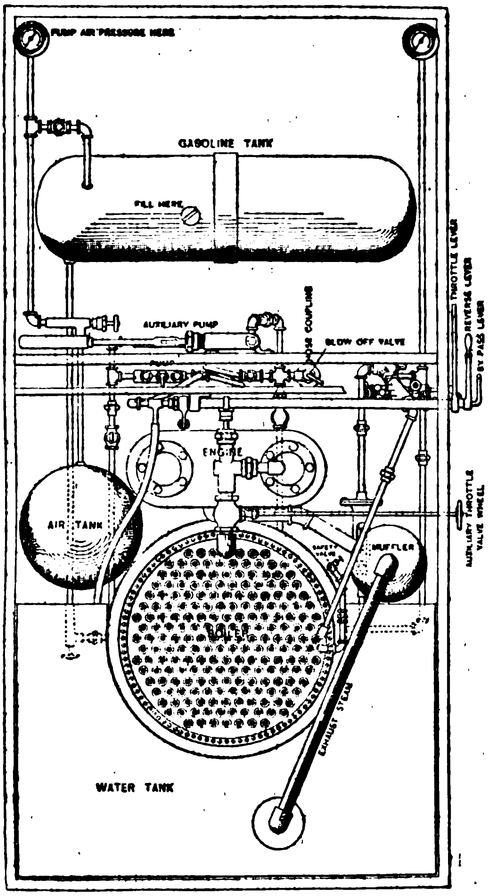
The gasoline motor vehicle promised by far the greatest dynamic efficiency, and much greater compactness of the power plant than the steam vehicle. The gasoline vapor engine converts liquid fuel into energy directly by the expansion of the fuel mixture under combustion; the engine is furnace, boiler and motor combined and may be started without lighting a fire, ready at any time. According to tests made in Germany it utilizes from 18 to 25 per cent of the work value of its fuel, against a maximum of 13 per cent for the steam engine. But, as the expanding gases cool very rapidly, losing nearly all their expansive force in one-half second after ignition has taken place, the efficiency of the engine depends largely upon its speed. Unlike the steam engine it has no reserve power at low speed and presents no possibility for economizing the surplus power when it is operated at its best while only small power is required. Moreover the wasted power results in noise and odor. So long as the conception prevailed that the economical efficiency of the vehicle hinged upon the fuel consumption — an idea inherited from steam engine practice — the gasoline vapor engine remained a very harsh and inflexible power source, wasting at the bunghole what was saved at the tap, when applied to transportation work. But its indisputable simplicity, robustness, compactness, light weight and economy where operated at constant speed and under constant load, encouraged the belief that its disadvantages for vehicle work would be reduced in the process of evolution, until they should be of smaller consequence than those attending the use of steam. An outline of the mechanical development of the gasoline vapor engine vehicle, which followed, is given under AUTOMOBILE.

In those countries where the use of steam had become most widespread, chiefly in England and New England, it was at the same time understood that both the water-tube and the vertical fire-flue tubular boiler might now be produced in extreme types adapted for a liquid fuel in such manner as to dispense with a bulky furnace and coal bunkers and bring the size and weight of boiler and engine within a compass adapted for vehicles. News of the first crude gasoline vapor engine vehicles and their shortcomings fanned this conception into activity.

A summary of the developments in the principal countries throws some light on the considerations which have shaped events, many of which are far from being consistent with scientific engineering. Three periods may be noted, the first ending 1896, the second 1900 and the third 1904.

First Period.— In England an old law, aimed against the early steam stages from the beginning of the century, prohibited motor vehicles on the highways by limiting speed to 4 miles per hour and imposing other restrictions. It was finally abolished in 1896 and a limit of 12 miles was adopted. Under the new system police espionage flourished, however, and much power was placed in the hands of country magistrates who were often prejudiced.

The emancipation from the prohibitory law has been celebrated every year after 1896 by the Automobile Club of Great Britain and Ireland in the form of a mass excursion and contest for motor vehicles. Until the repeal was enacted, very little was done to prepare the way for motor vehicle manufacture. The most important step was probably the formation of the Self-propelled Traffic Association of Liverpool, which aimed to foster the building of heavy steam drays to compete with railroads for short hauls of merchandise, mainly in the Liverpool-Manchester-Birmingham district.



Plan of Power Plant of Steam Carriage.

Equipped with vertical five-flue boiler and vertical two-cylinder engine. In other steam carriages horizontal engines are often used.

In Germany there were no co-operation, public contests or formation of clubs to encourage the motor vehicle movement. Neither automobiles or steam vehicles were looked upon with favor, but the electric industry, which was highly inflated, began to prepare the manufacture of storage battery vehicles.

In France, where Gottlieb Daimler found a capable disciple in Levassor, a comparatively large class of rich and leisurely young men, thirsting for activity in new channels and many of them graduated as engineers, embraced the promise of the new locomotion with eagerness. Steam and vapor-combustion engines were at first in about equal favor, but the tide soon turned to the latter. The first vehicle permitted to circulate in the streets of Paris was a coal-fired steam tricycle, however, built by Léon Serpollet in 1892. The Automobile Club of France was formed and, by reason of its influential membership and ardent work in its cause, soon became one of the leading clubs of Paris, and was able to moderate hostile legislation. In 1895 a contest was held between Paris and Bordeaux and an automobile designed by Levassor covered the entire distance (nearly 800 kilometres) at an average speed of 14 miles per hour. This design facilitated repairs of the motor mechanism by placing it over the front axle under a removable hood, while the change-gear mechanism was accessible by loosening a few bolts and removing the boards under the driver's feet. It leaped at once into popularity.

In the United States steam bicycles and small vehicles had been constructed in several places, especially by S. H. Roper of Roxbury, Mass., as early as 1870, and after his death the main principle of his construction was taken up by other New England experimenters and adapted to liquid fuel. Stationary gas and gasoline vapor engines were in somewhat common use, but technically trained men with leisure to devote to their adaptation to automobilism were scarce, and of all the men who gave attention to the problem only Charles E. Duryea of Illinois and Elwood Haynes of Indiana produced notable results. A Duryea vehicle traveled successfully through deep slush and snow in a circuit around the city of Chicago on Thanksgiving Day 1895, the occasion being the first public American contest for motor vehicles. In this participated also two electric storage battery vehicles; one of them made by Morris & Salom of Philadelphia, which made a creditable performance. Its construction was the upshot of a desire on the part of the storage battery industry to create a new outlet for its wares. Shortly afterwards stock companies were formed to engage in the manufacture of electric vehicles, and so potent was the magic of the word electricity, already associated with some distinctly American triumphs, so flattering the promise of producing swift, noiseless and cleanly motor vehicles in advance of the rest of the world, that popular stock subscriptions were obtained without much difficulty from Boston Bay to the Missouri River, although leading technical publications called strong attention to the defects of existing lead batteries for transportation work on rough streets, to the need of air-inflated tires for protecting them against shocks coupled with the unfitness of such tires for sustaining the battery weight, and to the very low efficiency of batteries, weight for weight, as compared with other power sources.

Second period, 1896–1900.— Of what was done for the evolution of the gasoline motor vehicle in England in this period little has remained. Close proximity to France and Belgium and numerous imports from those countries gradually compelled British manufacturers to fall in line with French design. Frequently they worked under license from French patentees. But the utilitarian view of the movement, always strong in Great Britain, found expression in considerable manufacture of heavy drays and trucks, mostly steam powered, and the importation of light steam vehicles from the United States. Coal or coke was in several instances the fuel for the heavy vehicles, and many experiments were made looking to the substitution of kerosene for gasoline in the light steam vehicles. This was especially with a view to their use in tropical colonies, where gasoline is more or less dangerous to handle and often unavailable. The steam drays were largely made by old established engineering firms, and several contests were held by the Self-propelled Traffic Association, above mentioned, to determine their worth. Steam tip wagons for the hauling and dumping of offal were built for and operated by the city of Liverpool, and similar developments followed elsewhere. The English motor vehicle periodicals flourished more than the home industry, owing to the support received from all other countries where motor vehicles or their component parts were made.

Toward the middle of this period (about 1898) several German bicycle manufacturers began to build automobiles under French licenses, and some original work was done here and there, but the results were indifferent. The only two prominent firms, Daimler's at Cannstatt and Benz's at Mannheim, did most of their business through branch houses in England and France; even so their output was small. At the same time, however, earnest work was done by the builders of stationary gasoline engines to determine the construction details by which such engines might be adapted to alcohol fuel. These investigations were encouraged politically. The idea in view was: Local production of fuel for local transportation problems, such as the hauling of produce from the large rural estates by traction engines, rail transportation of ore in mining sections, etc. The knowledge and experience gained in this manner were subsequently applied to many other purposes.

Electric omnibuses, cabs and trucks were made in considerable number in Berlin, Magdeburg and other centres of the overwrought electric industry, but though their construction and use were in several respects more conservative than the simultaneous development in the United States, the ventures did not prove economically profitable, and the electric trucks and beer wagons, rather common in German towns for a while, have mostly given way to similar vehicles propelled by gasoline or alcohol explosion engines. Investigations relating to steam vehicles were often concerned with the use of coal dust briquettes and similar by-products from waste material as fuel.

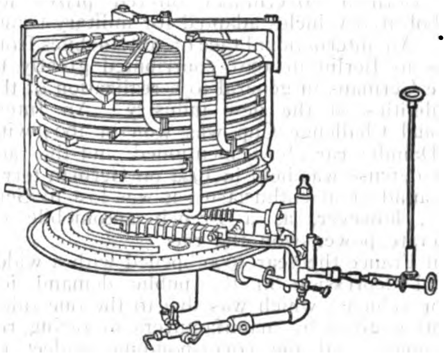
After the Paris-Bordeaux race of 1895 similar events were arranged for each of the following years in France, the speed of the automobiles increasing at each repetition, until 45 miles per hour was no longer unusual, when the end of the century was reached. The discovery had been made that high speed qualities were not only the most natural and easily attained of all the virtues that might be demanded of a motor vehicle, but also the most sensational and profitable, causing much public mention and attracting the support of the wealthy classes. Dispensations from the traffic rules were easily obtained from the French government, whenever the Automobile Club de France pronounced a long-distance road race needful for the development of the industry. Plenty of firms entered the manufacture of automobiles; plenty of engineering talent was devoted to the improvement of general design and the perfecting of minutiæ; public interest was enlisted at every step and patriotic motives were invoked to secure the glory to France of being the undisputed leader in automobile construction and manufacture. Reliability of operation under the highest speed was, however, the only test of merit generally acknowledged, and in the skirmish for racing honors steam vehicles, electric vehicles and the utility wagons of the gasoline motor type were almost forgotten, while the sporting automobile in all its forms, from the motor bicycle and tricycle to the overpowered *voiturette* and the leviathan racing machine, engrossed the attention. Serpollet, almost single-handed, advanced the steam-vehicle interests by developing the flash-boiler system (with kerosene fire), by which water is injected in small quantities into a thick-walled generator kept red hot, where it is flashed into superheated steam, the expansion of which is immediately utilized in the engine. As early as 1894 Jeantaud had built an electric vehicle. One took part in the Paris-Bordeaux race in 1895 (with frequent recharges of the battery) and covered 600 kilometres of the course. Kriéger, Mildé, Hurtu, and others followed; American electric carriages were imported; the city of Paris had built an electric street sweeper and sprinkler, also several vehicles for the fire department, and an electric cab company was formed and operated, with great loss. Jenatzy drove an electric “torpedo” car at 60 miles per hour on the race track at Asnières. But at the end of the year 1900 nearly all of these productions had disappeared. Accustomed to low cab fares, Parisians would not pay the high rates required to keep public electric cabs in commission, and the cab company soon suspended operations, as did similar companies in Boston, Chicago, and Philadelphia. Private electric carriages continued to be made in small number with continual changes in design, culminating subsequently in 1903 and 1904 in a combination of a gasoline engine with electric power transmission, as referred to later.

Italy and Austria during this period (1896 to 1900) began to enter the motor-vehicle field, following closely after French and German patterns in gasoline motor vehicles. American light steam cars were imported, and two Viennese firms began the manufacture of electric trucks and merchandise delivery wagons, similar to those made in Berlin. Some of these were ordinary wagons drawn and steered by an electric “fore-carriage” or tractor, connected by a fifth-wheel device. The first extensive European experiments with combinations of the gasoline motor and the electric-battery systems were made by one of these firms, the Lohner-Porsche Company.

In the United States the light steam pleasure vehicle reached its highest popularity and most extensive production in the year 1900, while the manufacture of electric carriages and cabs had culminated even before that time. In proportion as these two types declined the gasoline motor vehicle made headway, inclining more and more toward the French design, in so far as the larger and more powerful vehicles were concerned, but the great majority of the output belonged to the so-called «runabout» class, being small vehicles of about the same size as the steam cars and driven by a single-cylinder motor, horizontally mounted in the frame under the middle portion of the vehicle. (See AUTOMOBILES.) They usually suffered from many defects in design and workmanship, and were much inferior to the contemporary French cars of the same class (the *voiturette*). Numerically the runabout continued to prevail during the whole of the following period (1900 to 1904) with gradually improved design and workmanship and increased motor power.

Third period, 1900 to 1904.— So far the evolution of the motor vehicle had been formative and experimental in all countries and in all types. Now it became industrial and to a certain extent international. The types and styles of vehicles which had survived all had pronounced merit of some kind, and new types belonging specifically to this period were interesting as indicating the directions in which improvements were, and are, still sought, despite the high measure of reliability in operation already attained. Only a few vital features in the progress of the motor-vehicle movement in each country need to be mentioned.

England continued the free-trade mart for all countries, influencing design more through the demands of her public than by the efforts of her builders. The number of manufacturers increased rapidly, and many of them built substantial vehicles of good workmanship and pleasing lines, but no distinct advancement in the equipment of pleasure cars is traceable to their work, though it enjoyed the moral support of British royalty, and the Automobile Club of Great Britain and Ireland (now the Royal A. C. G. B. and I.) held many severely conducted public tests and encouraged investigations by a great many discussions of papers on engineering subjects. British capitalists invested largely in French manufacturing companies, and several of these erected branch factories in England. Nearly all British bicycle manufacturers made motor bicycles and created a great diversity of design as well as a considerable demand for this inexpensive type of vehicle among the young of the middle classes. The motors were usually imported from Belgium. Heavy steam and gasoline motor drays and traction engines remained the only field in which the British motor-vehicle industry took the lead, supplying, however, only its own and colonial markets. One of the most remarkable productions in this line was the Diplock tractor, which has been fittingly characterized as «half elephant, half traction engine.» Instead of the ordinary driving wheels this machine has rails, around which passes in succession a number of small wheels or rollers, each carrying a circular block-foot pivoted by ball-and-socket joints, and attached to steel spokes which may slide radially, being drawn inward by springs. The rail is pivoted to a flat guide plate free to rise or fall, against the resistance of springs, in a slotted plate rigid with the axle box. Two guides lead the revolving rollers under the lower portion of the rail. At many trials the heavy machine equipped with these yielding block-foot wheels has been proved capable of being driven over obstructions and soft ground where traction engines of the ordinary pattern would be stalled. Another departure from the usual wheel-traction system was originated in Germany and is known as the Keller Rail Ring Tractor. In this machine, which was tried and recommended by the British war department, each of the driving wheels revolves on the flanged inner periphery of an iron «rail ring,» being held yieldingly in contact with the rail by an elastic frame with two small guide wheels, which also ride the rail. Considerable lateral play between the flange of the driving wheels and the rail permit steering to be effected by twisting the rail rings, the wheels following their direction, as in railroad travel. The tractor consisted of two portions, pivoted together, so that each portion with its pair of wheels and rail rings could follow the ground, however uneven. Each portion had a separate engine and could be either rear or front. This machine was found capable of traveling and hauling loads across ravines and sandhills almost as well as over prepared roads.



American type of water-tube steam generator (shown with gasoline burner), producing superheated steam with a rapidity approaching that of the flash-boiler system and exceeding the latter in reserve power.

These exceptional constructions indicate in a measure what difficulties had been experienced in the hauling of heavy loads over rough or slippery roads by motor power applied at the wheel rims in the usual manner. Similar indications are found in the trucks, of the kind more generally manufactured, in provisions for locking the differential gear (for better wheel adherence on slippery roads and grades), in spring-attached driving gears on the rear wheels to minimize the shock of starting a heavily loaded vehicle, and in sprags acting against the ground in addition to the friction brakes, for security against backsliding on hills.

In Germany the death in 1900 of Gottlieb Daimler, justly called «the father of the automobile,» was the signal for almost revolutionary activity at the Cannstatt factory. The cooling-fan, the honeycomb radiator, the closed hexagonal motor hood, the combined flywheel fan and clutch, large gear-actuated inlet valves, improved carburetter and throttling, increased piston speed, pressed-steel frames and axles, were features introduced in quick succession, which in their total produced not only a very fast vehicle, but one which could travel silently and comfortably at low speed. Through this latter quality which had been much neglected in France, and a formerly unattained degree of reliability and durability in operation, due largely to careful calculation of dimensions and selection of materials, this rejuvenated German Daimler car compelled imitation in all countries, by not only winning races against the best French vehicles, but also earning the confidence of that class of motor-vehicle users who cared more for comfort than for excessive speed. At the same time the magneto-ignition apparatus (see MAGNETO) was perfected by German electricians, relegating the dry and storage batteries to the auxiliary function of assuring a spark for starting the engine from the seat, without "cranking." German motor-vehicle manufacturers in general had meanwhile continued in successful imitation of French prototypes, and many experiments with alcohol fuel were carried on, with the result that a large proportion of the German vapor engine trucks and delivery wagons may be operated optionally with gasoline or alcohol. The German government offered prizes for alcohol-fired vehicles adapted for military transport. An international race of automobiles from Paris to Berlin in 1901 contributed greatly to rouse Germans in general to a realization of the possibilities of the new industry. An International Challenge Cup was won in 1903 with the Daimler car above mentioned, and the race in its defense was held in 1904 on German territory amid great enthusiasm; it was lost to Germany, however, as a French automobile of moderate power won the race.

In France the year 1900 opened with a widespread depression in the public demand for motor vehicles, which was due to the one-sided attention given by manufacturers to racing requirements and the corresponding neglect of those factors in construction which would make for utility in daily life. The size, weight, and power of vehicles had grown apace, far beyond the needs of the average citizen, and prices were inflated. The methods adopted to remedy the situation were characteristic of the co-operative spirit of the French industry under the leadership of the Automobile Club de France. The majority of the manufacturers lowered their prices and reduced the speed and size of their cars, meeting the demands of the market. The club passed a salutary rule limiting the weight of racing machines to 1,000 kilogrammes (about 2,200 pounds), thereby compelling the selection of the lightest and strongest materials and the paring down of all dead weight. Racing was practically turned over to a few strong firms and was put on an international basis, so as to better serve its purpose of advertising the French industry abroad. The first of these international races was in 1900 from Paris through Belgium to Amsterdam, then in 1901 from Paris to Berlin, in 1902 from Paris to Vienna, with ever-increasing speed and loss of life, until finally the race from Paris to Madrid in 1903 was interrupted by government edict owing to the carnage among participants and onlookers. The speed on this occasion reached an average of 105 kilometres per hour for the first car which reached Bordeaux.

Internally affairs assumed a pronounced technical and utilitarian flavor for the benefit of the home market. Innumerable contests were held; public-service vehicles (omnibuses and cabs) were tried out with gasoline and with alcohol fuel, competitions in economy of fuel consumption, in hill-climbing capacity, in freedom from skidding on slippery ground, in brake efficiency, and other details were of weekly occurrence. The minister of agriculture arranged road races exclusively to popularize alcohol fuel; but it was nearly always a mixture of 50 per cent alcohol with 45 per cent benzol and 5 per cent water which was used. A ministerial technical commission measured and compared the motors with reference to the results in racing and prono brake tests, so as to establish data for the construction of engines for alcohol. The manufacturers hung the diplomas received for efficiency with alcohol on the walls of their offices and continued to use and recommend gasoline for daily practice.

With all these efforts trade soon flourished again after the depression, while real progress in construction languished somewhat, and the annual automobile exhibition in Paris in 1901 (December), saw a very large share of the public's interest centered in the exhibit of the German Daimler car. At the exhibition one year later, December 1902, most of the features of this vehicle had been incorporated in the products of the French industry.

During all of this Serpollet's steam racing cars, steam touring cars and steam omnibuses had occupied the centre of the stage for steam vehicles, winning most of the short distance road races at speeds above 62 miles (100 kilometres) per hour, many of the hill-climbing contests and gaining honors in the alcohol trials, in which the mixture of alcohol and benzol proved indeed a more convenient fuel than the kerosene usually employed in these machines for reasons of safety. Swift, silent, and built with much regard for the comfort of passengers, these French steam cars were exported in considerable numbers to England, Germany, and Italy, and even to the United States, where the White steam cars, with a similar system of steam generation, had gained a similar popularity.

Generally speaking, the year 1903 was given over to refinements and elaborations of details in all the established types of motor vehicles in France. Experimental work was confined to the combination of the gasoline engine and the electric systems. The object was to eliminate the storage battery as much as possible while obtaining the facile control peculiar to the electric car, and in one of the vehicles produced the battery was entirely discarded. The best results were obtained, however, by the use of a small battery, charged from the surplus power of the dynamo driven by the gasoline engine, and drawn upon when the engine power, transmitted through the dynamo, is insufficient, and for starting the engine.

Subsequent developments again eliminated the storage battery completely in most vehicles of this type, but the great weight of the equipment remained an objection to the system for vehicles operated on common roads. The simplicity of its operation recommended it, however, to street car and railway companies. The latter were beginning to look to the internal-combustion motor as a means for running single coaches by their own power, principally on suburban lines or branch lines with light traffic, and experiments with mechanical transmission systems had demonstrated that the skill required in their operation constituted a serious objection to their employment. With the gasoline electric system, on the other hand, the simple operation of the throttle would reduce the efficiency of the electric generator to zero, or, if preferred, the engine could be left running at constant speed, and the car speed could be regulated by electric controller. Either way, only the movement of a lever was required.

The total number of motor vehicles, not including motor cycles, registered in France in 1903 was 19,886, out of which number 14,340 seated more than two persons. In 1902 the number was 7,260, of which 2,572 were cars for one or two persons and 5,748 for more than two. In 1899 there were 726 small vehicles and 946 large ones in circulation. The number of registered motor cycles in 1903 nearly reaches that of the four-wheeled vehicles, being 19,816. But for comparison it may be stated that the number of ordinary bicycles was 1,310,223, being 826,809 more than were registered in 1898 and an increase of 103,481 over 1902. Nearly all of these cars and cycles were made in France, and in addition there were exported motor vehicles aggregating in value about $10,000,000. England took about two thirds of these, valued at $6,750,000, Belgium $1,055,000, the United States $1,140,000, representing about 300 vehicles, and Italy $585,000.

In 1905 the number of motor vehicles taxed in France had reached 28,598, out of which 4,559 were used for business purposes. The exports had increased to the value of $22,000,000.

In the United States, the period from 1900 to 1904 was one of immense industrial expansion, resulting in a production of perhaps 20,000 vehicles in 1903 alone. Accurate statistics are unobtainable in the absence of uniform rules for registration. The number of motor bicycles was perhaps 1,000 in all. It is estimated that about 40,000 vehicles and 1,500 motor bicycles were in circulation in the summer of 1904. In 1899, 1900, and 1901 there were made perhaps 5,000 to 6,000 light steam vehicles; in 1902 probably 1,000 to 1,500, including perhaps 300 of the American flash boiler system; in 1903 the number of the latter was about doubled, while very few steam vehicles of the fire-flue boiler type or the ordinary water-tube boiler type were made. In 1904 the flash boiler system was still progressing, but very light steam vehicles of the fire-flue type were again made in considerable number, perhaps 800 to 1,000 in all, mostly in a new form of manufacture. The production of steam vehicles for heavy hauling was, during the whole period, sporadic and experimental. The manufacture of automobile (gasoline motor) trucks were also limited to a very small number.

The American development of pleasure automobiles during this period, while numerically very large, continued to be mainly aimed at low-cost mass production of small single-cylinder vehicles («runabouts») seating two persons. A technical departure of importance was the employment of air-cooled motors (see AUTOMOBILE). Improvements in the design or nature of details and equipment were almost invariably promoted by European example. Of innovations, one which is usually considered as being still in the experimental stage, was the substitution of friction elements for gears in the power transmission system. Though wasteful of power at either the low or the high speed, and subject to frequent replacements for wear, this system gained some favor, mainly in the Middle Western States, through its simplicity and by offering a graduated scale of speed reductions, independently of the motor. It has been employed for omnibuses and light pleasure vehicles. (It is also extensively applied by a manufacturing company in Nuremberg, Germany.)

In the electric vehicle field two important improvements mark this period, in addition to a number of minor ones. The depression in the demand for electric carriages and cabs, resulting from their intrinsic shortcomings and the collapse of the companies manufacturing and operating those intended for public service, was followed by many partly successful efforts at reducing the vulnerability of lead batteries. Devices to prevent injuriously rapid discharge or exhaustion of batteries were applied and automatic charging apparatus were perfected, insuring against damage in that operation. By slow degrees the electric vehicle by these means became reinstated in public favor, though only in a somewhat narrowed field.

The next improvement, and by far the most radical and far-reaching of the period, was the perfecting of a battery by Thomas A. Edison, in which nickel and iron took the place of lead for the positive and negative plates of batteries. At the close of the period there was reason to believe that this improvement would effectually remove the most insidious features of the storage battery, namely, its vulnerability by shock and rapid deterioration by use and abuse. Each cell of this battery, however, is of lower voltage than the lead battery, so that more cells are required for the same work. A 60-cell iron-nickel battery takes the place of a 44-cell lead battery. The electrolyte is alkaline, and in practice it has been shown that battery efficiency is considerably reduced in very cold weather.

In 1906 the commercial use of this battery was still restricted, while a strong organization had been effected by the principal makers of lead batteries; taking the form of a chain of shops, in the principal cities, where the condition of batteries in use in trucks and carriages received expert attention, and local workingmen were trained in the simplest and most economical methods in the charging and washing operations, replacement of cells, etc.,— the «chores» of an «electric stable.»

A few of the mechanical elements of motor vehicles are essentially alike in automobiles, steam vehicles, and electric vehicles. Such are (1) the brakes, (2) the steering gear, and to a rapidly increasing extent, (3) the carriage work.

«Effective brakes» are required to be fitted to motor vehicles by the laws of all the principle countries. In some cases two sets, or even three, are compulsory. This constitutes the principal definite legal retriction in matters of motor vehicle construction, excepting a few usually unenforced regulations in regard to steam vehicles. A harsh brake destroys itself or the wheels or mechanism to which it is applied, while one that permits too much slip endangers traffic in general and the occupants of the vehicle. In early motor vehicles the band brake, usually leather faced, failed to prevent a vehicle from rolling backward down a hill, acting only against forward motion, because one end of the band was fixed. The drum, rubbing toward the fixed end, tended to buckle the band and reduce the friction surface. Block brakes gripped too harshly or not enough, besides causing violent vibration. In all modern band brakes the band is contracted from both ends simultaneously, and to obtain smooth, equable action, proportionate to the force applied, the leverage is high, while leather facing has been discarded in favor of metal-to-metal contact. In vehicles intended for mountainous regions provision is sometimes made for cooling the brake with water. A neat design is obtained by expanding two crescent-shaped shoes against the internal face of the drum instead of contracting a band around it. The outside of the drum may, then, be utilized for a sprocket without increased width. Being braced equally in all directions, this brake is naturally «double acting,» that is, effective against wheel motion in either sense. In electric vehicles one set of brakes usually acts upon the motor or motors; in automobiles and steam vehicles one brake acts upon the differential gear, while the emergency brakes act upon drums secured to the wheels.

The steering mechanism of motor vehicles is described in part under AUTOMOBILES. In so far as it relates to the front wheels and the co-ordinated turning of these around their respective vertical pivots, the system is known as the Ackerman system, and was in common use with ordinary vehicles during the first half of last century. In describing a curve the outer wheel should be turned less than the inner one, and this effect is obtained by placing the pivot levers at a small angle with the wheel plane, converging to the rear or diverging to the front. Usually the steering gear is attached to one of the pivot levers and the drag link takes care of the other wheel. In early automobiles and steam cars the mechanical elements between the driver's hand and the wheels consisted in a horizontal lever turning a vertical steering post at the lower end of which was a pulley, or equivalent device, with a cable to each of the pivots. This was varied in many ways, but was soon found unsatisfactory, because it communicated motion from the wheels to the steering lever, causing the latter to jiggle in the driver's hands. A remedy was found by using a worm gear at the lower end of the steering post, meshing with a toothed quadrant. This relieves the driver's hand and arm from vibration, but wear on the quadrant and worm gear, as well as in all joints and bearings of the whole mechanism, produces a play which renders steering insecure. In some vehicles devices, so-called «steering checks,» are interposed between the wheel pivot and the worm and sector to arrest the irregular motions before they reach wearable parts. Commonly, though not universally, a steering wheel is now (1904) used instead of a steering lever, for two principal reasons: (1) the wheel remains always in the same relation to the driver, whether turned little or much, permitting a larger steering motion of the hand for a given turn of the front wheels, if such less sensitive steering is desired; and (2) if the driver is thrown forward by sudden applicaton of the brake or other cause, his body will not turn the wheel, while it might turn a lever and thereby the vehicle, causing an accident.

The carriage or body work of motor vehicles was until the year 1900 a makeshift to fit the power plant and running gear while making concessions to the public's supposed unwillingness to depart from the forms customary in horse-drawn vehicles. The first decided breach was caused by the adoption of the slitted hood covering the motor placed over the front axle; in other words, the production of Levassor's type of automobile, in 1895, with its horizontal metal frame supporting all of the motor and transmission mechanism and all of the carriage work, the latter reduced to mere seats for the occupants. No other one factor has influenced the design of the carriage work as much as this type of automobile, after which nearly all automobiles, except American «runabouts,» and many steam vehicles have been patterned so far as the general outlines are concerned.

The principal development worthy of note — being not directly apparent to the eye — in motor vehicle bodies, is the gradual, and still by no means general, supplanting of wood by sheet metal, especially aluminum, for the body panels and seat-backs. Late years have seen an extensive adaption of canopy and buggy tops and closed bodies to all types of motor vehicles.

Recent Developments.— During the period from 1904 to 1906 the use of motor vehicles at all seasons, and the adaptation of closed bodies to automobiles in a great diversity of styles, were continued, but the employment of aluminum and other light metals and alloys in the construction of the bodies was almost abandoned in favor of wood and steel. Closed city and suburban vehicles were often built so as to be easily converted into open ones. The power of engines and the size and weight of the large pleasure cars were greatly increased. The weight of a convertible limousine body was about 1,000 pounds. At the same time, vehicles principally intended for country use and varying road conditions, where weight is a costly embargo by increasing the cost of tires and repairs, were usually equipped with cape cart tops, and extension tops, of canvas or imitation leather, which, in conjunction with draw-curtains and a plate-glass windbreak erected over the «dashboard,» produced the semi-closed vehicle, less elegant than the closed styles, but highly serviceable and much lighter. The transition from large closed cars to omnibuses was natural, and in Europe these two years became specifically the period of motor omnibus development. On the other hand, the production of small cars was also greatly increased, first in England, and then in France, while in America the «runabout,» with single-cylinder horizontal motor in the middle of the chassis and single-chain drive to the rear axle, was almost entirely abandoned in favor of the «small car» with double-opposed horizontal or four-cylinder upright engine in front. The larger American cars were patterned more closely than ever after the European type, with the exception that air-cooled four-cylinder and six-cylinder engines made great headway, even for vehicles of 16 to 24 horsepower and touring-car size. Gasoline trucks of up to five-tons load capacity were built and sold, perhaps 250 in all, and some of them proved suitable for many business purposes in the sizes up to three-tons capacity. Gasoline delivery wagons were built in larger numbers, usually over the chassis designed for pleasure cars. Toward the end of the period it was recognized as desirable to build the chassis for business wagons different from those intended for light and rapid pleasure traffic. With the use of solid instead of pneumatic tires, new problems with regard to the vehicle springs — not felt so much in Europe's better roads — presented themselves, and the necessity for having vehicles which could be driven by the ordinary teamster, after a little instruction, tended toward the use of slow-speed engines and epicyclic change-gear mechanism. The manufacture of electric trucks was much simpler, the batteries, motors, controllers, and gears being made by manufacturers in the electric industry, and probably 1,000 electric trucks and 2,000 electric delivery wagons were in use throughout the country, giving varying satisfaction. Electric vehicles, with terraced char-à-banc seats for as many as 48 persons, and termed observation cars, or sight-seeing cars, came into general use in large cities, as it proved possible to obtain full loads of visitors from towns and country willing to pay $1 to $1.50 each for «seeing the city sights» by this convenient method. Soon gasoline vehicles, seating as high as 30 persons, were built for similar work and for excursions to resorts beyond the traveling radius of electric batteries. In country districts gasoline omnibuses, seating usually not more than 12 persons, were placed in commission on many stage routes, experimentally. A dozen railway companies had built motor cars for suburban and interurban rail service, equipped with gasoline engines of 100 to 200 horsepower, or with steam engines of the automobile type, the gasoline engines usually drove by electric transmission of power.

The total number of motor vehicles of all kinds produced in the United States in 1906 was about 32,000; the total number in circulation was estimated at 80,000, including about 3,000 motorcycles; nearly 1.000 pleasure cars of European make, averaging about $7,000 sales value each, were imported in 1906.

On May 26, 1906, Congress passed a law, to take effect January 1, 1907, removing the internal revenue tax — $2.08 per gallon — from grain alcohol to be used for industrial purposes and rendered unfit for use as a beverage, and the use of alcohol for internal-combustion engines and as fuel for steam engines, in place of gasoline, was thereby rendered economically possible, but at the end of 1906 no suitable construction had yet been devised, either here or abroad, by which alcohol, unless mixed with equal volumes of gasoline or benzol, could be successfully employed in internal-combustion engines, except for work permitting their operation at practically constant speed and power development.

In Europe, technical progress was limited to details during these two years, but a strong movement for adapting the motor vehicle to business work and heavy cartage was commenced. The most notable upshot of this tendency was the very rapid introduction of large motor omnibuses for public service in London. At first these were all gasoline omnibuses and seated rarely more than 20 persons, but soon preference was invariably given to those seating 16 persons inside and 18 on the roof, and steam omnibuses were introduced in considerable number, then electric «auto buses.» In August 1906 the total of motor buses at work in the streets of London reached 600, giving great satisfaction to the population by comparison with the antiquated horse-drawn omnibuses, which they largely replaced. The economical results showed receipts of up to $50 per 16-hour day from fares, ranging from 4 cents up, on a schedule based mainly on mileage.

In Berlin a similar movement resulted in the formation of many omnibus companies, but the development was checked somewhat by the demand for omnibuses in London, which exceeded the capacity of all European manufacturers for this style of construction. In Paris the motor omnibus was adopted for certain routes by the Compagnie Générale des Omnibus. See AUTOMOBILES.

M. C. KRARUP,
Formerly Editor of 'The Automobile.'

Mott, James, American philanthropist: b. North Hempstead, L. I., 20 June 1788; d. Brooklyn, N. Y., 26 Jan. 1868. He was a teacher in a Friends' boarding school in Dutchess County, N. Y., at 19, where he married Lucretia Coffin, and in 1810 went to Philadelphia, Pa., where he engaged in mercantile business. He was a staunch friend of William Lloyd Garrison (q.v.), assisted in the organization of the Philadelphia Anti-Slavery Society in 1833 and attended as a delegate the World's Anti-Slavery convention in London in 1840. He was a determined supporter of the cause of woman's rights and in 1848 presided over the first woman's rights convention at Seneca Falls, N. Y.

Mott, Lucretia Coffin, American reformer: b. Nantucket, 3 Jan. 1793; d. near Philadelphia 11 Nov. 1880. With her parents, Thomas and Anna Coffin, she removed to Boston in 1804, and four years later became a teacher in a Quaker boarding school. She joined the Hicksite branch of the Quakers upon the schism of 1827. In 1833 she joined in the formation of the American Anti-Slavery Society, as whose delegate she went to the London World Convention in 1840, from which all women were excluded. The result was the woman's rights movement, in which Mrs. Mott became a leader, taking a prominent part in the convention held at Seneca Falls in 1848. Consult: Hallowell, and 'Letters of Lucretia and James Mott' (1884).

Mottled Owl, a small horned owl (*Megascops asio*), which, in one or another geographical variety, occurs numerously all over the continent, except in the colder parts of Canada. Very similar species are known in Central America and in Japan. It is only nine or ten inches long, with large facial disks, two small erectile horns and a short rounded tail. Its plumage is a mottling of gray and rust-red. These little owls are nocturnal and are almost blinded by daylight glare. They come out in the dusk of evening, and from sunset to darkness, or all night when the moon is shining, is heard their low, musical, trilling cry — one of the pleasantest of bird voices; yet in some evil way the name *screech-owl* was long ago fastened upon this bird. Its eggs are 5 to 7, pure white. The food of the mottled owl is chiefly small rodents and insects, and occasionally, in spring, small birds; they destroy a vast number of insects and mice hurtful to the farmer and gardener. Books upon American birds abound in facts as to their habits.

Mouchez, Amédée, ā-mā-dā moo-shā, French astronomer: b. Madrid, Spain, 24 Aug. 1821; d. Wissous, France, 25 June 1892. He was educated in the French Naval Academy and remained in the navy until 1878 when he was appointed chief of the National Observatory. He had previously shown himself a brilliant scientist and particularly distinguished himself in coast surveys of Algeria and Brazil as well as in the observation of the transit of Venus in 1874. He bent all his energies to the improvement of the observatory, introduced several innovations of value, and was the originator of the international photographic chart of the heavens. He wrote: 'Côtes du Brézil (1869–76); 'La Photographie astronomique et la Carte du Ciel' (1877); etc.

Mouflon, moof'lŏn, or **Musimon**, a wild sheep (*Ovis musimon*) of Corsica and Sardinia, where it wanders about the summits of the mountain ranges in small flocks, and offers excellent sport. It is a question whether this species ever existed on the mainland, one opinion being that it arose in the isolation of the islands; but most naturalists believe that it formerly existed in Spain. The rams are about 2¼ feet tall at the withers, and have very large coiled horns, but the females are hornless. The long mane-like hair that covers the neck and chest of the rams is gray, but the remainder of the coat is mainly rust-red above and white on the ventral surfaces. A similar «mouflon» inhabits Cyprus; and the Barbary aoudad (q.v.) is often called «ruffed mouflon.»

Moukden'. See MUKDEN.

Moulding. See MOLDING.

Moulds. See FUNGI.

Moule, mool, **Handley Carr Glynn**, English Anglican bishop: b. Dorchester, Dorsetshire, 1841. He was educated at Cambridge University, took orders in the Anglican Church, and was an assistant master at Marlborough College 1865-7. From 1873 to 1876 he was dean of Trinity College, Cambridge, and he was first principal of Ridley Hall, Cambridge, 1881-99. He was nine times select preacher at Cambridge and once at Oxford, was Norrisian professor of divinity at Cambridge 1899-1901 and in the last named year was consecrated bishop of Durham, succeeding Bishop B. F. Westcott (q.v.). He has published many devotional and expository works, among which are: 'Thoughts on Christian Sanctity'; 'Ephesian Studies' (1900); 'The Secret of the Presence' (1900); 'Thoughts for the Sundays of the Year' (1901).

Moulton, mōl'tŏn, **Ellen Louise Chandler**, American poet; b. Pomfret, Conn., 10 April 1835. d. 10 Aug. 1908. Ehe was married to William U. Moulton, a Boston publisher, in 1855. She had a wide literary acquaintance both in this country and in England, where she has spent a part of every year for many seasons. Her weekly receptions both in Boston and London were the resort of many literary and artistic persons. She published such books children as 'Bedtime Stories' 1873–5–80, while her other writings include 'Some Women's Hearts' (1874); 'Miss Eyre from Boston' (1889); 'In the Garden of Dreams'; 'Lyrics and Sonnets' (1890); 'Lazy Tours in Spain and Elsewhere' (1896); 'At the Wind's Will,' verse (1899); etc. Her lyrics are extremely musical and as a sonneteer she ranks among the first.

Moulton, Richard Green, Anglo-American educator: b. Preston, England, 5 May 1849. He was graduated from the University of London in 1869 and at Cambridge University in 1874, since when he has lectured in various American and English universities, and has been professor of English literature in the University of Chicago from 1892. He is the author of: 'Shakespeare as a Dramatic Artist' (1885); 'The Ancient Classical Drama' (1890); 'An Account of an Experiment in the Study of Fiction' (1895); 'Literary Study of the Bible' (1896); 'The Moral System of Shakespeare' (1903); etc.

Moultrie, mōl'trĭ, **William**, American soldier: b. South Carolina, 1731; d. Charleston, S. C., 27 Sept. 1805. He early allied himself with the military forces of the colonies and in the war with the Cherokees in 1761 the confidence of his fellow citizens in his ability was shown by his selection as captain of the regiment raised to defend the frontier against the Indians. At the outbreak of the American Revolution in 1775 he was appointed colonel of the 2d colonial regiment and he also served as member of the South Carolina provincial congress in that year. He was engaged in the seizure of the public arsenals and the construction of fortifications around Charleston, and in March 1776 was ordered to construct a fort on Sullivan's Island. This he made of the only material at hand, palmetto logs, and when General Lee made an inspection he expressed his disapproval of the work, considering it totally unfit for the purpose of defense and advised its abandonment. Moultrie, however, continued the work and when an attack was made by the British fleet under Sir Peter Parker the rude fort successfully withstood all assaults and was subsequently named for its brave commander. He was promoted to the rank of brigadier-general in recognition of his services and given command of the forces in South Carolina and Georgia. So complete had been the defeat of Parker, however, that Charleston was not again attacked until 1779 when the British availed themselves of the absence of a large share of the Continental force and attacked the town. The return of General Lincoln saved the city, but in the spring of 1780 a third attack by land and sea compelled capitulation. Moultrie was held a prisoner for two years and though offered rank and money to enter the British army remained loyal to the cause of the colonies. Release came in 1782 and though promoted to the rank of major-general it was too late for him again to engage in active service. He was elected governor of South Carolina in 1785 and in 1794, and published in 1802 'Memoirs of the Revolution.'

Moultrie, Fort. See FORT MOULTRIE.

Mound Birds, a group of Australasian gallinaceous birds remarkable for the large mounds which they build as incubators for the eggs. See MEGAPODES.

Mound Builders, The, a general term popularly applied by antiquarians and ethnologists to the aboriginal race of people residing on the

American continent, and by whom the various earthworks called Indian mounds, forts, etc., were constructed. Scientists have never agreed as to the connection of the mound builders, so-called, with the American Indian known first to civilization in the 16th and 17th centuries. Many ethnologists claim the mound builders and the Indians were one and the same people, while others hold that the aborigines were an entirely different race.

In North America.—The architectural remains of the mound builders are to be found in each of the grand divisions of the continent. That portion of the United States which lies between the Appalachians and the Rocky Mountains presents in three groups at once the oldest and the rudest monuments of by-gone times; the first group extending from the sources of the Allegheny to the waters of the Missouri; the second occupying the Mississippi Valley, vaguely so defined; and the third stretching from South Carolina to Texas. These several groups, apparently with very little difference among themselves, consist of numberless mounds, and circumvallations of earth and stone — 1,500 of the latter, and 10,000 of the former, being said to exist in Ohio alone. The erections themselves range from 5 to 30 feet in height; while the areas enclosed — generally of some symmetrical figure, such as circle or ellipse, rectangular parallelogram or regular polygon — vary from 20 to 40 acres, though among a few of greater extent, one in Arkansas is stated to embrace a square mile. The circumvallations, moreover, seem generally to contain the mounds; and sometimes a smaller circumvallation is surrounded by a larger one. Whether these colossal structures were intended for worship or for defense, it is impossible to decide; more probably, however, they were of a military character, provided, as they generally were, with cisterns for water. But, whatever their origin, they derive interest from the analogous fact that, within the same territorial limits, have been dug up vases of earthenware or copper in elegant forms, pipe-bowls decorated with human heads of the type of the existing aborigines, or with those of birds, etc., domestic utensils, personal ornaments, hatchets of stone, and, lastly, weapons of copper or mica, or shell or obsidian.

In South America.—The architectural remains of Central and South America are at once of more modern origin and more elaborate character, and may be roughly compared with the cyclopean ruins in Italy and Greece. Uniformly in the pyramidal style — a style likely enough to be indigenous in a region of earthquakes — they are composed of blocks generally huge, and sometimes enormous; those in the walls of Tiahuanaco in Bolivia being equivalent to cubes of about 16 feet each way. Between those of South America and Central America, however, there are diversities as well as resemblances. Those of South America, situated, as they are, within the native limits of Peru, and referred, as they must be, to its closing era under the Incas, cannot reach back beyond the Spanish conquest more than 300 or 400 years. Those of Central America, again, are reckoned to be considerably more ancient, reaching five or six centuries further back, and being partly the work of the Aztecs, whom the Spaniards conquered, and partly of the Toltecs, whom the Aztecs had themselves supplanted. Nor is the fact altogether without significance that, in the two more southerly divisions of the continent, those mysterious records of the past are generally superior in development in proportion as they are anterior in age; those of Central America, as a whole, surpassing those of South America; and, again, within Central America itself, the earlier specimens of Oaxaca, Guatemala, and Yucatan, eclipsing the later ones of Mexico proper. While attempting, in the light of these remains, to appreciate aboriginal civilization, one cannot fail to be struck rather with their magnitude than with their beauty, rather with the evidence of despotism in the ruler than with traces of skill in the subject.

Prehistoric Copper Mines.—Among recent discoveries was that of a prehistoric copper mine on the Isle Royale in the northern part of Lake Superior. These mines were worked many years before Columbus was born, by the prehistoric races who procured from them metal for their implements and ornaments. The copper occurs there in masses of the pure or «native» metal, embedded in the volcanic rocks, and the primitive miners were accustomed to dig it out with no better tools than stone sledges. Although the island is not adapted for human habitation, tribes from all the surrounding country gathered there in ancient times for the purpose of obtaining the precious material. In order to find it a great deal of «prospecting» had to be done, and thus the surface of the hills to-day are everywhere found covered with old pits and trenches, partly filled up and overgrown with pine forests. In these ancient holes are discovered numerous stone implements which bear the marks of use as mining tools. So thickly are such rude tools scattered about that not less than 50,000 of them are to be seen on the surface of the ground, affording an illustration of the extensive character of the work that was carried on. The copper was sometimes found in masses so big that they could not be removed, and many such gigantic nuggets of pure metal have since furnished bonanzas to the whites, who for years made a business of exploring the old workings in search of them. One nugget weighed 12,000 pounds, and because it was not practicable to cut it up or blast it into pieces it had to be conveyed bodily to the lake shore and carried away in a vessel, requiring much ingenuity and the best modern appliances for the successful accomplishment of the task. When the natives came across such a mass of copper the best they could do was to break off a few projecting pieces of it. The business of prospecting for such abandoned nuggets was finally given up by the whites, because they ceased to find enough of them to pay, although more than 1,000 pits remain untouched by them. After the miners of antiquity had got the copper they hammered it into tools and ornaments, which were carried to all parts of North America and distributed by trade. Such articles, for which the material was originally obtained from Isle Royale, are found to-day in mounds and graves throughout this country and not infrequently as far away as Central America.

Flint Quarries.—In Arkansas is a prehistoric quarry where flint for making into tools and weapons was procured on so extensive a scale that in places the hills and mountains have been actually remodeled by the pittings and trenchings. From one hillside it is estimated that upward of 150,000 cubic yards of flint have been removed and worked. Another locality explored in Indian Territory yielded for the purposes of the aborigines a chalky kind of flint, which was procured in enormous quantities for making large implements, such as hoes and other agricultural tools, and also knives that were very long, slender and thin. It was useful to select pieces of best quality for the manufacture of knives, just as nowadays the finest steel is employed for cutlery. A third great quarry in Ohio, near Newark, worked on a very extensive scale, supplied a beautiful flint of fine grain for arrow-points and spear-heads. It furnished with these articles an extent of territory equal to a half dozen States, and they are found to this day as far south as Tennessee and as far east as New York.

The Grave Creek Mound.—One of the most interesting mounds of North America is that known as the Grave Creek Mound, located 12 miles below Wheeling, W. Va., on the left bank of the Ohio River, near Moundsville. The mound is situated on an elevated table-land, and is an artificial truncated mound, some 70 feet high and 900 feet in circumference at its base. The mound was built by a race superior and previous to Indians, and is the most notable mound in the Ohio Valley. Its cubic contents are equal to the third pyramid of Mycerinus, but was heaped up by a people destitute of the knowledge of iron, and who had no domestic animals or machinery to aid them. They were evidently people like the Egyptians, ruled by some one monarch, who was able to combine vast numbers in the erection of one structure, and, at the same time, able to provide them with food in abundance. The mound builders cultivated the soil like Egyptians, and had maize for their food, as the date and leek and onion supplied the wants of the laborers on the Nile. No Indian was ever known to toil in this manner. No government existed among the Indians that could bring them to such servitude. The authority of a chief or sachem is too slender a thread for such a people. It must be remembered that in Egypt to build one of the pyramids required the labor of 360,000 men for 20 years. This mound was visited by white men at a very early date, for, in 1818, one of the large trees growing on the mound bore the date of 1734, and several names cut in the bark were yet distinguishable. A. Tomlinson, the owner of the mound, was induced — by his neighbors and friends in Wheeling — to open the mound, which he did in 1838. From the north side he excavated toward the centre an adit 10 feet high and 7 feet wide along the natural surface. At the distance of 111 feet he came to a vault that had been excavated in the earth before the mound was commenced; 8 feet by 12 feet square and 7 feet in depth. Along each side, and across the ends, upright timbers had been placed, which supported timbers thrown across the vault as a ceiling. These timbers were covered with loose unhewn stone, common in the neighborhood. The timbers had rotted, and the stone tumbled into the vault. In this vault were two human skeletons, one of which had no ornaments. The other was surrounded by 650 ivory beads and an ivory ornament about six inches long. A shaft was also sunk from the top of the mound to meet the other. At 34 feet above the first or bottom vault, was found another, similar to the first. In this vault was found a skeleton which had been ornamented with copper rings, plates of mica, and bone beads. Over 2,000 disks cut from shells were found here. The copper rings, or bracelets, found, weighed about 17 ounces.

North Carolina Mounds.—In 1880, about four miles from Wolf Creek, North Carolina, a mound eight feet high was found and opened. After digging to the surface of the earth on the edge, the investigators went through to the centre, and found a skeleton. After getting out 54 bones, including the skull and chest, they traced him out to get his length. He was, as nearly as could be determined, seven feet in length. From the appearance of his jaw-bone, he must have been a very large man. Nothing else was found except a small rock that had been broken, about three inches long, perfectly smooth, and with a small hole through it, which it is supposed was used for a pipe-stem. Around the skeleton was a row of burnt rock; under this ashes and fire-coals.

Mounds in Ohio.—While mounds are common throughout the Mississippi Valley, Ohio is most prolific in these remains. It has been estimated that over 10,000 mounds have been found and over 500 examined in the district between Lake Erie and the Ohio River. On Kelley's Island in Lake Erie, not far from Toledo, are many evidences of a prehistoric people and numerous mounds are to be found there. The serpent mound near Peeble's Station, Adams County, Ohio, is one of the most unique and interesting relics of the mound builders. It is an earthen structure in the form of an immense serpent, some 1,300 feet in length. Near Canal Winchester, Ohio, in a large mound was found a collection which consisted of 54 copper pieces representing button-shaped ornaments, celts, large plates and bracelets. All had been hammered together evidently to destroy their identity. Some of the plates if straightened out would measure eight and one-half inches long and four inches wide. With the copper pieces were found five broken pieces of slate ornaments and 34 pieces of galenite, and over all were placed quantities of mica in sheets, and all were found one foot below the surface and placed within the space of 18 inches by 24 inches. The Butcher mound, so called from W. C. Butcher, is located near Homer, Ohio, on the Licking River. It is 500 yards from the river, upon a level plateau, 15 feet above the river bed. On the north side of the mound is a large walnut stump, three feet nine inches in diameter. Large maple trees are growing upon the mound, the largest being 18 inches in diameter. The top of the mound is perfectly flat, forming a platform having an area of more than 1,600 square feet. The mound is 13 feet high and 135 feet in diameter north and south, and 126 feet in diameter east and west. In this mound was found a skeleton, that of an adult, buried one foot below the surface and covered with 96 small granite boulders averaging five inches in diameter. The skeleton was badly decayed and only a few pieces of ribs and vertebræ could be saved. The evidence obtained from the exploration of this mound is sufficient to justify the conclusion that the mound was built for burial purposes, and in some religious ceremony the body or bodies were cremated in the large fire-pit in the centre of the mound. In a swamp near Copley, Summit County, Ohio, is a large mound 200 feet wide, surrounded by a ditch 13 feet across. This has been named Fort Island. Similar ancient earth forts, with exterior ditches, are often seen in Ohio, occupying the crown of a hill. By flooding the swamp this would become an island, equally inaccessible, as a precipitous hill. The race of ancient earth builders thoroughly appreciated the military advantages of position. In Florida the Spaniards found Indian stockades surrounded by running water. Champlain found similar works among the Iroquois in 1513, which he attacked in the valley of the Onondaga. See ARCHÆOLOGY, AMERICAN.

Consult: Carr, ‘Mounds of the Mississippi Valley,’ and works by Schoolcraft, Peet, and others; also various reports and monographs published by the Bureau of Ethnology, Smithsonian Institution, Washington; and the Peabody Museum of Archæology, Cambridge, Mass.

WILL M. CLEMENS,
Editorial Staff, ‘Encyclopedia Americana.’

Mound City, Ill., city, county-seat of Pulaski County; on the Ohio River, and on the Illinois C., and the Cleveland, C., C. & St. L. R.R.'s; about 200 miles south of Springfield and eight miles north of Cairo. It is in an agricultural section, but the principal industries are connected with manufacturing and trade. The chief manufactures are furniture, pumps, staves, headings, and other lumber products, boxes, trunks, ice, foundry and machine shop products. It has considerable trade in its own manufactures and in farm products. A National Cemetery, located here, contains 5,310 graves of which 2,732 are unknown dead. Pop. (1910) 2,837.

Mound City, Mo., city in Holt County; on the Chicago, Burlington & Quincy railroad; about 40 miles north by west of Saint Joseph. It is situated in a fertile agricultural region in which farming and stock raising are the chief occupations. Its principal manufactures are canned fruits and vegetables and dairy products. Its trade is in farm products and live stock. In the vicinity are numerous mounds belonging to the age of the Mound Builders (q.v.). Pop. (1910) 1,575.

Moundsville, moundz'vĭl, W. Va., city, county-seat of Marshall County; on the Ohio River, and on the Ohio R. and the Baltimore & O. R.R.'s; about 12 miles south of Wheeling. It is situated on a point of land, about a mile wide, at the confluence of the Big and the Little Grave creeks. It was once called Grave Creek, and at first there were two small villages called Elizabethtown and Moundsville. The present name is on account of the Mammoth Mound nearby, one of the largest ancient mounds in the United States. In the vicinity are other mounds classed as the Grave Creek group of mounds. The Mammoth Mound is connected with a series of earthworks of ancient construction, and is 820 feet in circumference, at the base, and 63 feet in diameter at the summit. It is about 70 feet in height. In the chambers have been found shell beads, ornaments made of mica, others carved in stone, copper bracelets, and other ancient articles.

Moundsville is in an agricultural and coal region and the industries are connected with farming and coal mining. Pop. (1890) 2,688; (1900) 5,362; (1910) 8,918.

Mounet-Sully, moo-nā-sü-lē, stage name **of Jean Sully Mounet,** French actor: b. Bergerac, Dordogne, 27 Feb. 1841. He began his studies at the Conservatoire, Paris, in 1862 and appeared first on the boards of the Odéon; but his theatrical career was interrupted by the Franco-Prussian war through which he served. In 1874 he joined the company of the Théâtre Française, where he gained his reputation as a tragedian of the highest order. His ‘Achille’ and ‘Hippolyte’ are powerful and most affecting impersonations, and he is equally successful in Shakespearian roles and the modern dramas of Victor Hugo.

Mount, William Sidney, American painter: b. Setauket, Long Island, 26 Nov. 1807; d. there 19 Nov. 1868. He studied at the National Academy, N. Y., and became a member in 1832. His power as a genre painter was first proved by ‘Corn Husking’ although he had aroused interest by his ‘Raising of the Daughter of Jairus’ (1828) and a number of striking portraits, including a full-length of Bishop Onderdonk. He may be looked upon as the founder of the American school of genre, and is particularly happy in his treatment of negro characteristics. He has a genuine sense of humor and his ‘Bargaining for a Horse’ (New York Historical Society); ‘Raffling a Goose’ (Metropolitan Museum); ‘A Long Story’ (Corcoran Gallery, Washington) are real pictures of American life.

Mount Auburn, a celebrated burial-place in Cambridge, Mass., covering over 100 acres. Here are the graves of Longfellow, Lowell, Sumner, and other well-known men.

Mount Ayr, ār, Ia., town, county-seat of Ringgold County; on the Chicago, Burlington & Quincy railroad; about 70 miles south by west of Des Moines. It is in an agricultural and stock-raising region, and its industries are chiefly connected with the farm products. The principal buildings are the court-house, churches, and the schools. Pop. (1890) 1,265; (1900) 1,729; (1910 est.) 2,000.

Mount Car'mel, Ill., city, county-seat of Wabash County; on the Wabash River, and on the Cleveland, Cincinnati, Chicago & Saint Louis railroad; about 145 miles southeast of Springfield. The place was settled in 1818 and in 1868 was chartered. It is in an agricultural section; but the good water-power has contributed toward making it a manufacturing city. The chief manufactures are flour, paper, lumber, furniture, lumber products, strawboard, machinery supplies, shafting, pulleys, and dairy products. It has the railroad shops of the «Big Four» railroad. There is considerable trade in manufactured articles, farm products, and live-stock. Pop. (1890) 3,376; (1900) 4,311; (1910) 6,934.

Mount Carmel, Pa., borough in Northumberland County; on the Northern C., the Philadelphia & R., and the Lehigh V. R.R.s; about 45 miles north by east from Harrisburg. It is in a mountainous region in the midst of valuable coal fields, and nearby are a number of large anthracite mines. The manufactures are mining implements, miners' lamps, hats, caps, men's clothing, flour, and cigars. The borough has an extensive trade in lumber and coal. Pop. (1910) 17,532.

Mount Car'roll, Ill., city, county-seat of Carroll County; on the Chicago, Milwaukee & Saint Paul railroad; about 25 miles southwest of Freeport and 10 miles east of the Mississippi River. It is situated in an agricultural and stock-raising region, and in the vicinity are deposits of iron ore. It is the seat of the Frances Shimer Academy, and it has a high school and a high school library. Pop. (1890) 1,836; (1900) 1,965; (1910 est.) 2,200.

Mount Clemens, Mich., city, county-seat of Macomb County; on the Clinton River, and on the Grand Trunk railroad; about 22 miles northeast of Detroit. Electric railroad lines connect the city with Detroit and the towns along the coast. The first settlement was made in 1802; and the original plan of the village was made in 1818 by Christian Clemens. This first plat consisted of 60 lots now in the business centre of the city. The cooperage business was most important in the early days; the staves and heads for oil casks and barrels being made in Mount Clemens and shipped to large oil firms in New Bedford, Mass. Then Mount Clemens was considered the most important place in Michigan; but with the decay of whaling and the whale-oil industries, the cooperage business declined and the town was at a standstill for several years. In 1865 a company prospecting for oil sank a well at Mount Clemens. After going to a depth of about 1,300 feet they abandoned all hope of oil, but found salt instead. Soon a new company was formed for the purpose of manufacturing salt, but the enterprise did not prove a success because of the quality of the salt. In 1868, apparently by accident, the discovery was made that the water from the salt wells possessed remarkable medicinal properties and since then the place has had a steady growth which is increasing each year. Large sanatoriums, hotels, and bathing places have been built to accommodate the thousands of people who annually visit the place seeking health. The mineral waters, classed as sulpho-iodo-chromo-salines, as they come from the wells are about 50° F., and very rich in mineral salts, chiefly chloride of sodium and chloride of magnesium. About 30 different chemical ingredients constitute their make up. Each bath, 65 gallons, contains 120 pounds of mineral salts in solution; also sulphuretted hydrogen gas and carbonic acid gas. The wells range in depth from 800 to 1,200 feet. Each large bath house has its own well. By means of the modern pumping system the water is brought to the surface and stored in large tanks. Pipes carry this water to boilers where it is heated as ordered by the physicians and then carried by other pipes to the bath houses. The Mount Clemens mineral waters have become famous for their efficacy in rheumatism, gout, skin troubles, catarrhal conditions, diseases of women, nervous disorders, auto-intoxication, neurasthenia, etc. Physiologically they act by absorption principally. The water during a bath is carried into the blood and lymphatic system through the skin. In this wise it rids the system of all impurities and toxic agents incident to the various different ailments; at the same time a certain stimulus is maintained to the nervous system. The beautiful residences, broad, well-kept streets and grounds, the long lines of shade trees, the parks, the drives, all make the place most attractive. Gratiot Avenue is virtually a continuation of the avenue of the same name in Detroit. Both avenues are parts of what was once the government road made in 1840 and extending from the fort in Detroit to the fort at Port Huron. The churches and schools compare favorably with others in the State. Mount Clemens has considerable manufacturing and commercial interests. Some of the manufacturing establishments of the city are a carriage and wagon factory, beet-sugar factory, machine-shops, and cooperage works. The government of the city is administered under the law of the State for the cities of the fourth class. Pop. (1900) 6,576; (1910) 7,707. DR. RICHARD LEURCHNER.

Mount Cook, or **Aorangi,** New Zealand. See COOK, MOUNT.

Mount Desert, dĕ-zert' or dĕz'ĕrt, an island off the coast of Maine, the largest belonging to the State, part of Hancock County. It is separated from the mainland by Western Bay, Mount Desert Narrows, and Frenchman's Bay. It is about 15 miles long and eight miles wide; area, about 100 square miles. The coastline is very irregular; the chief indentations are on the north, Eastern Bay; on the south, Somes Sound, a fiord which extends into the centre of the island, and Southwest Harbor and Blue Hill Bay. On the west is Seal Cove and Western Bay. Bartlett's Narrows on the west separates Bartlett and Mount Desert Islands. On the south Cranberry Passage separates Great Cranberry Island from Mount Desert. The irregularity and nature of the coast-line, and the separation of the island from the mainland is due to submergence of the land and weathering. The surface is mountainous, along the northern coast is a line of rugged cliffs, and Green Mount, in the interior, is over 1,500 feet in height. Several fresh-water lakes beautify the island and add to its attractiveness. Long Pond, Eagle Lake, Jordan's Pond, Echo Lake, and Seal Cove Pond are the principal bodies of water lying wholly within the interior.

The principal harbors are Bar Harbor, Southwest and Northeast harbors. The island is a favorite summer resort; the most popular place is Bar Harbor. In Frenchman's Bay are five rocky islands called the Porcupines, and about 20 miles south, in the open ocean, is Mount Desert rock, on which is built a lighthouse.

The first authentic account of this island was given by Champlain (q.v.), who gave it the present name. In 1608 M. De la Saussaye, and the Jesuit Fathers Lallemant, Masse, Quentin, and Biard, together with 25 colonists from France, established on Somes Sound a colony which they called Saint Sauveur. Eight years later the colony was destroyed by a party of Englishmen from Virginia. The first permanent settlement was made by Abraham Somes, who in 1761, built a house at the head of the sound which still bears his name. The town of Mount Desert was incorporated in 1789; Eden, in 1796; Cranberry Isles, in 1830, and Tremont, in 1848. The population of the several towns as given by the Federal census is as follows: Mount Desert, 1,600; Eden, 4,379; Cranberry Isles, 374; Tremont, 2,010.

Consult Fairfax, ‹At Mount Desert.›

Mount Etna. See ETNA, MOUNT.

Mount Everest. See EVEREST, MOUNT.

Mount Forest, Canada, a town in Wellington County, Ontario, on the south branch of the Saugeen River, and on the Toronto, Grey & Bruce railroad, connecting with the Canadian Pacific and Grand Trunk R.R.'s. Its industrial establishments include flour, grist, saw, and woolen mills, and it has manufactures of iron, agricultural implements, leather, pottery, and bricks.

Mount Gil'ead, Ohio, village, county-seat of Morrow County; on the Whetstone River, and on the Cleveland, C., C. & St. L. and the Toledo & O. C. R.R.'s; about 40 miles north by east of Columbus. It has considerable trade in farm and dairy products, and it is a distributing centre for quite a section of the county. Pop. 2,200.

Mount Holly, N. J., town, county-seat of Burlington County; on Rancocas Creek, and on the Pennsylvania Railroad; about 15 miles east of Philadelphia. It is in an agricultural section, but its industries are chiefly manufacturing. The industrial establishments are foundries, large shoe factories, a hammock factory, machine-shops, and canneries. It has the Children's Home, the Burlington County Hospital, and the Burlington County Lyceum of History and Natural Science, founded in 1876. The library connected with the lyceum contains about 7,000 volumes. Some of the other prominent buildings are the churches, schools, and county buildings. Pop. 4,900.

Mount Holyoke (hōl'yōk) **College,** a college for women at South Hadley, Mass. It was founded by Mary Lyon (q.v.); chartered in 1836 and opened in 1837 under the name of Mount Holyoke Female Seminary. From the first it has had a reputation for thorough scholarship; the curriculum was gradually enlarged and the entrance requirements raised until a full college course was given and the old seminary course entirely superseded. In 1888 the name was changed to Mount Holyoke Seminary and College, and in 1893 to Mount Holyoke College. Formerly three degrees were given, A.B., B.S., and B.L.; but A.B. is now the only degree conferred. The course is arranged in two years of required and two years of elective work; the curriculum includes pedagogy, biblical history and literature, and music and art; a limited amount of technical work in the latter courses may count toward the degree. Provision is also made for graduate work leading to the degree of A.M., and for special work for school teachers. Graduates are entitled to fellowships in the American School of Classical Studies at Athens, and in the similar school at Rome; also to the advantages of the Zoological Station at Naples and the Marine Biological Station at Wood's Holl, Mass. Entrance to the college is by examination or certificate from approved schools. The campus now includes about 150 acres; the principal buildings are Mary Lyon Hall, which occupies the site of the original building destroyed by fire in 1896, the Dwight Memorial Art Building, Lydia Shattuck Hall for the physics and chemistry departments, the Lyman Winston Hall for the other sciences, the observatory, the gymnasium, the seven large residence halls, and the library which contained in 1910, 45,000 volumes; there are also plant houses and botanical gardens. It was a feature of the founder's plan that a consinderable part of the domestic work should be done by the students, each student giving an hour a day to such work; the time required was gradually reduced to half an hour; students are still allowed to assist in doing the general housework; the lighter part beng entirely done by them. It has become a custom also to give to students a part of the clerical and some laboratory work instead of housework. Full attention is given to physical training; regular gymnasium work is required for the first three years of the course, and there is provision for polo, basket ball, tennis and golf. In 1910, the productive funds of the college amounted to $839,000, the income for the year was $271,000; the students numbered 755, the faculty 83, and the total number of graduates, 4,084.

Mount of Olives. See Olives, Mount of.

Mount Pleasant, Iowa, city, county-seat of Henry County; on the Saint Louis, K. & N. and the Chicago, B. & Q. R.R.'s; about 120 miles east by south of Des Moines and about 28 miles west of the Mississippi River. It is in an agricultural region in which considerable attention is given to raising horses and live-stock. Large limestone quarries are in the vicinity. It was settled in 1834 by Pressley Saunders; incorporated in 1838, and chartered in 1851. The chief industrial establishments are flour and lumber mills, brick yards, potteries, wagon and carriage factories, grain elevators, and machine shops. It has considerable trade in grain, limestone, horses, and live-stock. It is the seat of the Iowa Wesleyan University (M.E.), founded in 1844, the German Theological College (M.E.), founded in 1873, and Hone's Academy. It has 13 churches, a conservatory of music, a high school, public and parish schools, and a Carnegie free public library. The State Hospital for the Insane is located here. The three banks have a combined capital of $250,000. The government is vested in a mayor and council of eight members, all of whom hold office two years. The city owns and operates the electric-light plant and the waterworks. Pop. 4,200.

Chas. G. Rogers,
Editor 'News.'

Mount Pleasant, Mich., city, county-seat of Isabella County; on the Chippewa River; and on the Pere M. and the Ann A. R.R.'s; about 70 miles north by west of Lansing. It is in an agricultural and lumbering region, but the city has considerable manufacturing. The principal industrial establishments are brick and tile works, wagon and carriage factories, lumber and flour mills, foundry, machine-shops, woolen-goods factory, and furniture works. A Government Indian School and the Central State Normal School are in this city. Pop. (1890) 2,701; (1900) 3,662; (1910 est.) 4,000.

Mount Pleasant, Pa., borough in Westmoreland County; on the Pennsylvania and the Baltimore & O. R.R.'s; about 25 miles southeast of Pittsburg. It is in a region of good farm lands and extensive coal fields. The chief manufactures are iron, glass, flour, foundry products, lumber, coke, and dairy products. The Western Pennsylvania Classical and Scientific Institute, under the auspices of the Baptists, is located here. Pop. (1910) 5,812.

Mount Saint Elias. See Saint Elias, Mount.

Mount Saint Mary's College, a Roman Catholic school in Emmitsburg, Md., founded in 1808. In 1910 there were connected with the school 30 professors and instructors and 352 students. There were nearly 30,000 volumes in the library, and the buildings and grounds were valued at $190,000. The courses lead to the degree of A.B. The Theological Seminary connected with the college was also founded in 1808, and in 1910 had an attendance of 60 pupils. Both schools are in charge of the secular clergy.

Mount-Stephen, George Stephen, Baron, Canadian financier: b. Dufftown, Banffshire, Scotland, 5 June 1829. He removed to Canada in 1850 where he engaged in mercantile business and became wealthy. He was afterward president of the Bank of Montreal and was conspicuous in promoting the completion of the Canadian Pacific Railway for which service he was knighted by the queen in 1886. He returned in 1888 to England and in 1891 was created Baron Mount-Stephen.

Mount Ster'ling, Ill., town, county-seat of Brown County; on the Wabash railroad; about 70 miles west by north from Springfield. A fertile agricultural region surrounds the town, and coal and clay deposits are in the vicinity. The chief manufactures are tile, brick, flour, wagons, and dairy products. The town owns and operates the waterworks. Pop. (1910) 1,986.

Mount Sterling, Ky., city, county-seat of Montgomery County; on the Chesapeake & Ohio railroad; about 31 miles east of Lexington. It is in an agricultural region, and has considerable manufacturing. Its chief industrial establishments are flour and planing mills, a distillery, machine-shops, and furniture works. It has several private schools, good public schools and a public library. Pop. (1890) 3,629; (1900) 3,561; (1910 est.) 3,500.

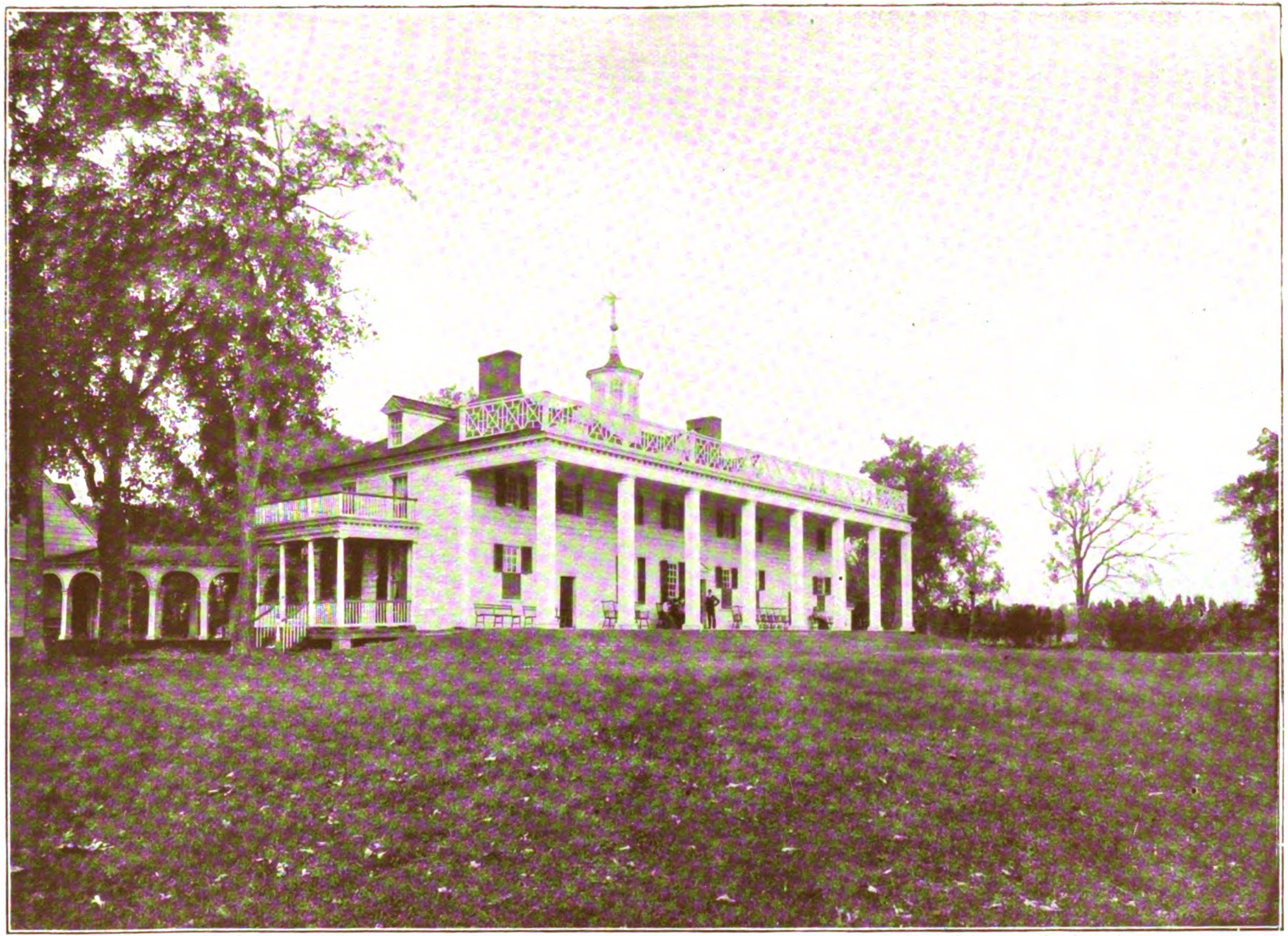
Mount Union College, in Alliance, Ohio, coeducational, founded in 1846 under the auspices of the Methodist Episcopal Church. Its courses lead to the degrees of A.B., B.S., Ph.B., and B.L. In 1910 there were connected with the school 33 professors and instructors and 520 students. Short summer courses are provided for the long vacation. The number of volumes in the library was about 7,000. The grounds and buildings were valued at $192,000, the scientific apparatus, machinery, and furniture at $82,500; the productive fund amounted to $180,000, and the income from productive fund, tuitions, and other sources, $20,000. The benefactions were $8,000.

Mount Vernon, the estate of George Washington, in Fairfax County, Va., on the right bank of the Potomac, 15 miles below Washington, D. C. The original name of the estate was Hunting Creek, and it contained about 800 acres. When it came into possession of Lawrence Washington, the brother of George, he changed the name to Mount Vernon, in honor of Admiral Vernon of the British Navy. The house is of wood, erected on a bluff 200 feet above the river. It is a two-story house, 96 feet long and 30 feet deep. The main part was built by Lawrence Washington in 1743 and the wings were added by George Washington; the estate came into possession of George Washington in 1752 after the death of his brother. In 1859 the house and 200 acres of land around it was bought by the Mount Vernon Ladies' Association; the purchase money was $200,000, raised in great part by Edward Everett. Since then the Association has restored the house as nearly as possible to what it was in the life time of George Washington. A high piazza extends along the front of the house, and the six rooms on the ground floor contain many objects of historical interest connected with the life and times of Washington. The key of the French Bastille, the furniture used by the family, in the piazza the tiles which were brought from the Isle of Wight, and many other relics are objects of attraction to visitors. In the garden are a number of trees planted by Washington, and in the coach-house is his carriage. The room at the south end of the first floor is the one in which Washington died. In 1831 the body of Washington was removed from the old family vault to a tomb, a plain brick structure, which is near a wooded ravine, a short distance from the house. Behind an iron grating may be seen the two sarcophagi which contain the remains of George Washington and his wife, Martha.

The estate was willed by George Washington to Bushrod Washington, and at the death of the latter it came into possession of John A. Washington, from whom the Ladies' Association purchased the house and adjacent grounds. Consult: Lossing, 'The Home of Washington'; Wineberger, 'Home of Washington at Mount Vernon.'

Mount Ver'non, Ill., city, county-seat of Jefferson County; on the Southern, the Wabash, Chester & W., the Chicago & E., and the Louisville & N. R.R.'s; about 115 miles south by east of Springfield. The place was laid out for a city in 1819 and in 1872 was incorporated. It is in a fertile agricultural region, and in the vicinity are extensive deposits of bituminous coal. The chief manufactures are machine-shop products, flour, lumber, cars, axe handles, dairy products, and dressed marble. It has large coal yards, a grain elevator, and brick yards. It has considerable trade in grain, coal, and live-stock. The principal buildings are the Supreme Court building, the county buildings, the churches, and schools. According to the provisions of the original charter, the government is vested in a mayor, who holds office two years, and a council. Pop. (1910) 8,007.

Mount Vernon, Ind., city, county-seat of Posey County; on the Ohio River, and on the Evansville & T. H. and the Louisville & N. R.R.'s. It is in a rich agricultural region; the industries are largely connected with the farm products. Coal is found in the near vicinity. It was settled in 1812 by a Dutch colony from Pennsylvania. The place was incorporated in 1830, and in 1853 was chartered as a city. The principal manufacturing establishments are flour mills, hominy mills, brick yards, strawboard works, machine-shop products, lumber and lumber products. The educational interests are provided for by good public and parish schools and a fine library. The Carnegie Library building will be ready for use in 1904. There are seven churches and a fine court-house. The two banks have a combined capital of $100,000, and the annual business is about $1,000,000. The



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MOUNT VERNON.

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government is vested in a mayor and a council of eight members, each of whom holds office two years. Pop. (1910) 5,563.

Mount Vernon, Iowa, town in Linn County; on the Chicago & Northwestern railroad; about 65 miles west of Clinton. It is situated in a rich farming region and its manufacturing and commercial interests are connected largely with the products of the farms. It is the seat of Cornel College (M.E.), established in 1857. Pop. 1,700.

Mount Vernon, N. Y., city in Westchester County; on the Bronx River and Hutchinson River, an arm of Pelham Bay, and on the New York, N. H. & H., and the New York C. & H. R. R.R.'s; adjoining New York city on the north, and about 13 miles from the Grand Central Station in New York. Electric lines connect Mount Vernon with New Rochelle, Yonkers, and a number of the villages and cities in the vicinity. Rapid transit lines from New York city extend almost to Mount Vernon (1903) and the present plans provide for the extension of the lines into the heart of the city.

Mount Vernon is really a residential suburb of New York; a large part of the city is restricted for residential purposes. It was founded in 1852 and in 1892 was chartered. It has several industrial establishments and considerable trade, chiefly in the products of market-gardens and as a distributing centre for the nearby sections of county. The Westchester Lighting Company is located here. It has about 1,000 employees, and furnishes for many places in Westchester County, light, power, and heat for public and private uses. The streets and avenues are well paved and well-kept. The handsome lawns and gardens and the great number of shade trees make the city most attractive. Some of the prominent buildings are the Mount Vernon Hospital, the Lucas Building, a post-office, fine church and school buildings. It has a public library founded in 1896, and the building donated by Andrew Carnegie, at a cost of $50,000, was begun in 1903.

The water, electric-light, and sewer systems are all well organized and are being improved and extended to meet the needs of a growing city. The government is administered under the original charter, which provides for a mayor who holds office two years, and a council. The mayor appoints, subject to approval by the council, all the administrative officers except the board of education, comptroller, assessors, and receiver of taxes, who are elected by the people. Pop. (1910) 30,919.

Mount Vernon, Ohio, city, county-seat of Knox County; on the Kokosing River, and on the Cleveland, A. & C., and the Baltimore & O. R.R.'s; about 40 miles northeast of Columbus and 85 miles southwest of Cleveland. It is in an agricultural region and near the natural gas belt. The chief industrial establishments are a foundry, the Corliss engine-works, flour and lumber mills, locomotive works, furniture factory, cooperage, sash and door factory, bentwood works, and bridge works. It has considerable trade in manufactured articles and in farm and dairy products. The Hiawatha Park, the court-house, the library, and fine church and school buildings, all contribute to the attractive features of the place. The city owns and operates the waterworks. Pop. (1890) 6,017; (1900) 6,633; (1910) 9,087.

Mount Washington. See WASHINGTON, MOUNT.

Mountain Ash, Wales, a coal and iron-mining town of Glamorgan, four miles southeast of Aberdare. The principal buildings comprise the parish church of St. Margaret, the Workman's Hall, a library and reading-room, etc. Pop. about 35,000.

Mountain Ash, Quicken Tree, or **Rowan Tree,** popular names for a small European tree (*Sorbus aucuparia*) of the order *Rosaceæ,* and, by extension, for two American species. The European species is an erect, graceful tree about 30 feet tall; bears ash-like, odd-pinnate leaves; corymbs of small yellowish-white flowers followed by globular orange colored acid fruits (pomes). It is frequently planted for ornament and seems to thrive upon any soil except that which is very heavy or very light, or poorly drained. It does well in the cold north beyond the range of most fruit trees, and there the fruits are often made into preserves. The hard, compact wood is used for turning, cabinet work, etc. In Europe its twigs are highly prized by the superstitious as charms and as guardians against evil sprites.

The American species (*S. americana*), which resembles the preceding, ranges from Labrador to the mountains of North Carolina and from there irregularly northwestward to Manitoba. With the exception of its wood, which is light and inferior, it is used like the first species. The elder-leaved species (*S. sambucifolia*) ranges from Pennsylvania, Michigan and California to Greenland and Alaska and extends in eastern Asia as far south as Japan. It is much smaller than the previous species and is much more variable. Its flowers and fruits are larger and its leaves are more like those of the elder. In the southern part of its range it is only occasional; in the northern, common.

Mountain Beaver. See SEWELLEL.

Mountain Blacksnake, Mocking-bird, Plover, Sheep, etc. See BLACKSNAKE, MOCKING-BIRD, PLOVER, SHEEP, etc.

Mountain Climbing, a modern adventuresome amusement, which in the 20th century may be classified as a species of sport. It is true that hardy adventurers found their way to the summits of mountains as early as the 18th century, when in 1787, Balmat ascended Mont Blanc, but the systematic and scientific climbing of mountains had its growth from the formation in 1857 of the first Alpine Club in London, which was organized to enlarge "the community of feeling among those who in the life of the High Alps have shared the same enjoyments, the same labors, and the same dangers."

Alpine Clubs.— Alpine clubs and mountain-climbing societies have since been organized in nearly all continental countries, and at least four such organizations exist in the United States, the American Alpine Club of Philadelphia, organized in 1902; the Appalachian Mountain Club of Boston, organized in 1876; the Manzanas Club, of Portland, Ore., organized in 1894, and the Sierra Club, of San Francisco, organized in 1892. These four associations have a combined membership of over 300. The European clubs and societies have an aggregate membership of over 185,000; the German clubs having 56,000, Italian, 54,000; French, 6,000; and Swiss, 7,000.

Climbing Records.— The records of mountain climbers cover all nationalities and various years from Balmat (1787) to Outram (1902). The highest point thus far climbed in foreign lands was in the Himalayas in 1883, by W. W. Graham, who reached a height of 24,015 feet. In North America, the Duke of Abruzzi and his party reached a height of 18,100 feet on Mount Saint Elias in 1897. In South America, S. Vines climbed 23,393 feet in the Andes in the same year. The highest summit (15,217 feet) was reached by Smythe and party in the Swiss Alps in 1855. In 1898, Mrs. Workman accompanied her husband, Dr. W. H. Workman to the summit of Koser Gunge in the Himalayas, a height of 21,010 feet. Mount Washington, in the White Mountains, has been climbed to an altitude of 6,293 feet, while Pike's Peak, in the Rocky Mountains, has been reached to the 14,147 mark.

Accidents.— In the Alpine countries, thousands of Swiss, Italians and Tyrolese have become professional guides, and their skill exceeds that of the most scientific of learned Alpine club members. Hundreds of lives among both visitors and guides have been lost in the Alps, but this fact does not appear to deter thousands of others from making perilous ascents each year. Accidents in mountain climbing rarely occur when guides are taken and the party is properly roped together. Occasionally a foothold seemingly secure gives way; but more frequently the fall occurs because the climber is övertired, or has started too quickly, without the necessary training. Over-exertion of either body or mind is always to be avoided. The use of the alpenstock and the ice-axe in mountain climbing, as well as general directions for making an ascent and descent, are fully set forth in a manual prepared under the auspices of the London Alpine Club, entitled 'Dent's Mountaineering,' which was published in the Badminton Library in 1892.

Bibliography.— Ball, 'Peaks, Passes and Glaciers' (1862); Collie, 'Climbing in the Himalayas' (1889); Conway, 'The Alps from End to End' (1895); Dent, 'Above the Snowline' (1885); Fitzgerald, 'Climbs in the New Zealand Alps' (1896); Forbes, 'Travels Through the Alps' (1843); King, 'Mountaineering in the Sierra Nevada' (1886); Mathews, 'The Annals of Mont Blanc and the Matterhorn' (1898); Stephen, 'The Playground of Europe' (1871); Wilcox, 'Camping in the Canadian Rockies' (1900); Workman, 'The Ice World of the Himalaya' (1898).

Mountain-cure, a graduated system of mountain or hill climbing now advocated in certain quarters for the strengthening of the heart and the body generally, especially in valvular disease and fatty infiltration of the heart. While in certain cases it may be useful, it should not be attempted except under medical direction.

Mountain Ebony. See BAUHINIA.

Mountain-fever, or **Mountain-sickness.** The term mountain-fever was applied formerly to a fever accompanied by debility, diarrhœa, etc., which occurred quite frequently (and now occurs occasionally) in the mountains, especially those in the western part of the United States. It is now generally conceded that this form of fever is essentially typhoid, modified by the effects of extreme altitude. The term mountain-sickness (sometimes used synonymously with mountain-fever), means a condition produced by the action of rarefied air upon organic functions, especially in persons who exercise considerably. The intake of oxygen is diminished in high altitudes; the pulse is quickened, and the body-temperature raised to 100°-101° F. Difficulty in breathing, headache, vertigo, nausea, and vomiting are likely to occur. Hæmoptysis is rare. Rest and acclimatization are the remedies.

Mountain Goat. See ROCKY MOUNTAIN GOAT.

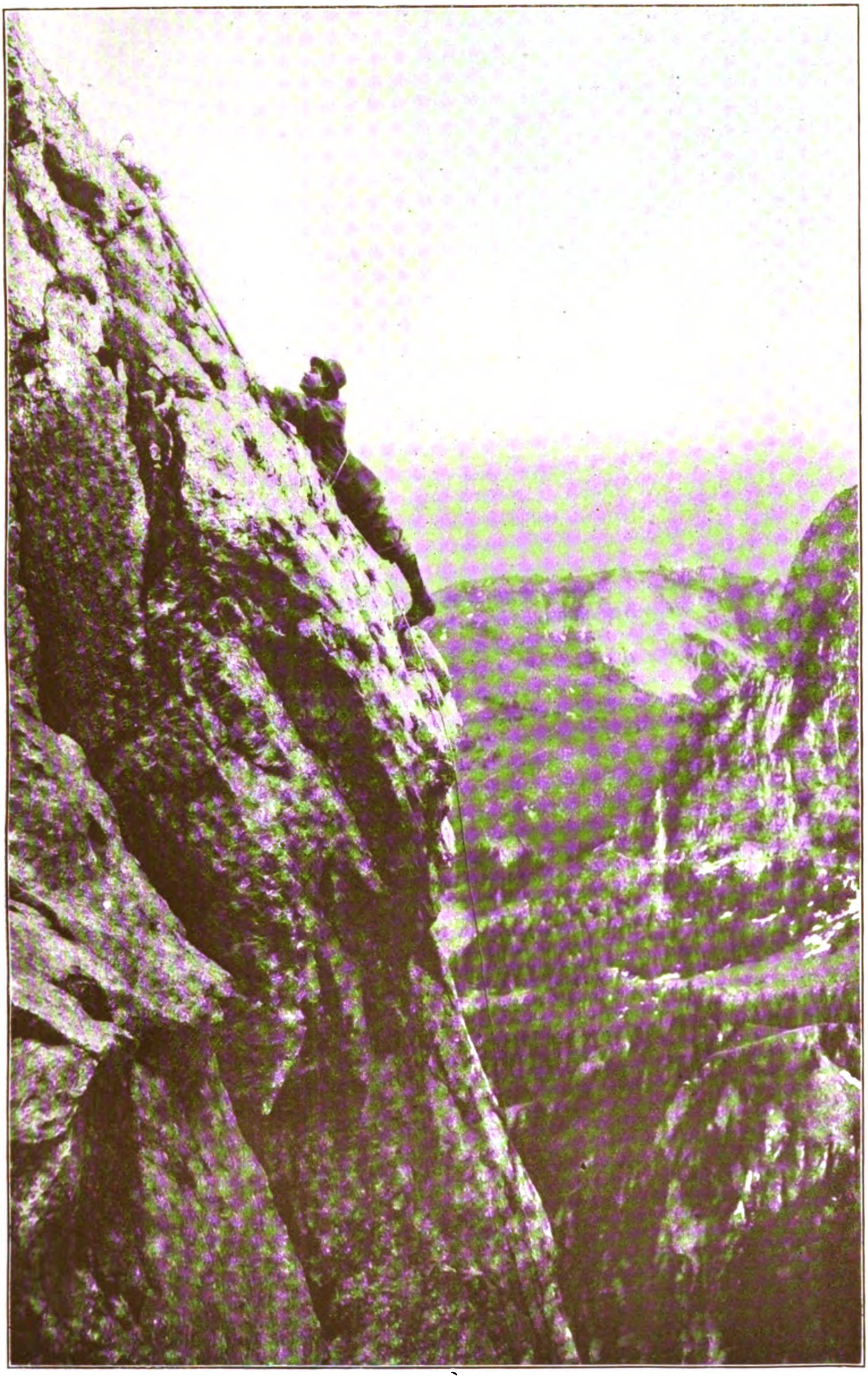
Mountain Laurel, or **American Laurel,** a shrub of the genus *Kalmia* of the order *Ericaceæ.* The few species which are natives of North America and Cuba are mostly shrubby, evergreen, and highly ornamental, especially when in flower, the blossoms being usually in terminal corymbs or axillary umbels, individually of medium size, white, pink or purple. On account of their beauty and hardiness most of the species are very popular for planting in parks and private grounds even in the northern States and southern Canada. They do well in ordinary garden soil if not too clayey, but thrive best in peaty or sandy soil, particularly in partial shade. They require plenty of moisture and will do well even in marshy soil. The best known species is probably *K. latifolia,* most frequently known by the above names and also as calico-bush and rhododendron. It ranges from New Brunswick to Ohio and southward to Florida. Sheep-laurel (*K. angustifolia*), also known as wicky and lambkill, extends from Labrador southward to Georgia. These two species are the most conspicuous flowers in the Alleghany Mountains during the early summer. *K. polifolia,* also found in the East, is common in the Rocky Mountain region from Alaska to California. The deciduous species *K. hirsuta* and *cuneata* range southward from North Carolina. They are less planted in the north than the first two species.

Mountain Limestone, a term commonly used in England of the stratum in southern England and Wales at the base of the sub-carboniferous deposits. The phrase was also used for a time of the limestones of American plains, but has now been dropped. It contains many fossils, especially encrinites and some important fossil fish. Its commercial value, apart from its being a bearer of lead and zinc ores, lies in its use as building stone, since it is capable of a high polish, and for the preparation of lime.

Mountain Lion. See COUGAR.

Mountain Mahogany, the sweet or black birch. See BIRCH.

Mountain Meadows Massacre, in American history, a massacre of Western emigrants, near Mountain Meadows, Utah, in September 1857. The emigrants numbering 140 souls were on the way from Arkansas and Missouri to Southern California. While in camp in the valley of Mountain Meadows, in Zion County, they were attacked by Indians and it is alleged by Mormons disguised as Indians. They held their ground for three days, when under promise of protection by John D. Lee (q.v.), a Mormon



One of a Mountain-climbing party on the Little Mithen, Switzerland.

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bishop and Indian agent, they left their barricade of wagons; whereupon the attack was renewed and every person of the 140 slaughtered excepting 17 young children. These were distributed among Mormon families but were afterward restored to their relatives by the United States Government. The Mormons have always been blamed for the massacre. Consult Linn, 'Story of the Mormons' (1902).

Mountain Tea. See GAULTHERIA.

Mountains. A high elevation of land is called a mountain; a low elevation, a hill. The application of the term «mountain» varies in different localities. In the lowlands, where the elevations are not numerous, and do not reach a great height, a rise of ground of about 100 or 200 feet is called a mountain; while in a mountainous country an elevation of 1,000 feet, or less than 2,000 feet, is called a hill. Prominent parts of mountains or isolated mountains are called *peaks*. Some of the common names applied to the parts of a peak, or mountain, are summit, base, slope, crest, pinnacle, needle, knob. A series of connected mountains form a *ridge, range,* or *chain;* if the mountains extend a considerable length, the whole is called a range or chain; if short, a ridge. A group of parallel ridges or ranges, or of ridges or ranges near together, usually resultants from similar causes, is called a mountain *system;* and several systems combined form a *cordillera*. An elevation with a level-topped area of considerable extent, is called a plateau and is usually associated with mountains. Many of the highest mountains of the world rise thousands of feet above the basal platform of the plateau. The *mesa* is a large level-topped section of the plateau; the *butte* is a small level-topped section. Valleys, lower land than plateaus, exist between the ridges, ranges, or systems. A wide valley is often an *interior basin*. The interior basin area of Australia is over 51 per cent of the whole area; of Africa, 31 per cent; of North America, 32 per cent, and of Eurasia, 28 per cent. (See GREAT BASIN; VALLEYS.) Low, narrow places in mountain ridges and chains are called *passes*. The depressions among the mountains contribute in a great measure to a solution of the causes which have determined the kind and location of the vast elevated land masses of the earth.

The most prominent and the greatest number of mountains in the world are formed by the (1) folding of the earth's crust. These folds are broken into ridges and chains, and are modified by another cause for mountains in their present form; (2) denudation or the destructive action of the elements; (3) and still another cause for mountains as they exist is eruptive action. Various theories have been advanced regarding the causes of the mountain folds, the arrangement of the rocks along certain lines, and while it is generally accepted that heat has had much to do with the present condition of the earth's surface, yet so little is known of the interior of the earth that no theory yet advanced can as a whole be accepted. If it is true that the heat is passing from earth into space, then contraction will explain many of the peculiar mountain forms of the world. The changes now taking place in the Japanese Islands and the coast ranges along the Pacific, would seem to contribute corroborative evidence, if not positive proof, in favor of the contraction theory. No convulsions except volcanic are now taking place, but the changes of centuries seem to be made by a slow folding process. Whatever may be the cause which makes the uplift on the earth's surface, denudation begins as soon as the peak appears, and formation and destruction are conjoint agents in making the mountains what they are on the surface of the earth. Before the process of folding is completed the elements have begun their work of shaping and sculpturing, but the destructive agents at first work more slowly than the constructive. The chief agents of changes after formation are wind and water. The position of a mountain gives some idea of its rock structure, and its rock structure and form tell something of its age. The presence of hard rock in a mountain is often shown by the upright peak whose faces may be comparatively bare, but which points up, resisting wind and water. Pike's Peak is granite rock. The White Mountains, N. H., have many hard rocky peaks; the Matterhorn, in the Alps, is a hard crystalline rock, and some of the Alaska peaks are examples of almost unyielding formations that appear to defy the ages. Remarkable examples of the sculpturing of the mountains by water are shown in the gorges in the Rocky Mountains, the rugged slopes, and combined with the wind, the etchings on the rocks; the removal of soft layers leave the hard rocks standing like gigantic castellated ruins as on the slopes of the Rockies. The high, sharp pointed peak and the irregular rugged surface indicate that the mountains are not among the oldest of the earth. The Adirondacks, with their low, rounded tops, their comparatively uniform slopes, show that long periods have passed since their formation; erosion and weathering have removed much of the ruggedness and sharp angularities that once existed. Along the Atlantic coast east of the Appalachian Mountains the low round hills are remnants of what were once high mountains.

Mountains formed by eruptive processes are volcanic and may be divided into three groups: (1) active, (2) dormant, or (3) extinct. There are vast regions in which there was once volcanic action but where now no volcanoes exist; as the east coast of the United States, the central part of France, part of the eastern Rocky Mountain section, the British Isles, and other places. The Mississippi Valley has a large area that possesses no indications of ever having had volcanoes. The plateau of Deccan has an area of 200,000 square miles covered with lava. The lava covering portions of the Snake River Valley is of great depth. Volcanoes are located in the vicinity of the oceans and are commonly present in high mountains. Notable exceptions among high mountains are the Alps and Himalayas. The great line of volcanoes extends from the Andes in South America to Alaska, then from the northeastern coast of Asia to the East Indies, around to and including the island of Sumatra. There are now no active volcanoes in the United States except in Alaska, which with Mexico and Central America contains the active volcanoes of North America. In the State of Washington there are volcanic cones so perfect in form that they may be only dormant. There are thousands of cones on the plateaus of the Rocky Mountain system, some almost destroyed, some as if only sleeping.

The most important substances emitted from volcanoes are steam, lava, volcanic-ash, or pumice. A *mud flow,* such as destroyed Herculaneum in 79 A.D., is caused by the water from violent thunderstorms falling on the volcanic-ash and washing it down the slope. A lava flow rarely extends more than 30 miles from the crater. The nature of the eruptions differ. The most violent occur in volcanoes that have had the longest periods of rest. (See Vesuvius.) Krakatoa (q.v.) has had but one eruption in more than a century. The volcano on the Lipari Islands is in action nearly all the time; the eruptions are ash, but vessels passing do not fear danger. The form of the cone depends upon the number and nature of the eruptions. When a volcano has ceased action, the work of denudation soon manifests itself. The soft part is carried down the slope, and the centre or the place where the rock is hardest remains standing, and is called a *neck* or *plug.* These forms exist in large numbers on the western plateau of the United States. (See Pelée, Mount.) There are good reasons for believing that there are many volcanoes beneath the ocean. The volcanic cones which have appeared above water, in modern times, one off the coast of Alaska and one in the Mediterranean, would seem to prove their existence on the ocean bed. A number of the active volcanoes are out of the great volcanic line, and are within the Atlantic Ocean basin. At the opposite ends of the mid-Atlantic ridge are important volcanic formations; at Tristan de Cunha and Iceland, and there are volcanoes on the Canaries, Azores, and in the Mediterranean. Earthquakes (q.v.) seem to have a close relation to volcanoes. The fault line of mountains is as often caused by the earthquake as by the volcano.

The mountains of the world are distributed with remarkable uniformity. The longest and highest ranges of North and South America face the Pacific Ocean, and extend almost due north and south. The longest and highest ranges of Eurasia extend nearly east and west. Starting from the highest plateau in the world, Pamir, in Asia, there are extending west, mountain ranges which are continuous through Europe to the Atlantic, and, also, with but few low depressions along the eastern coast of Africa to Cape of Good Hope. Passing east from the plateau of Pamir are lofty mountain ranges extending to the northeastern part of Asia, then crossing to Alaska, unite with the great ranges which skirt the western coast of the Americas. The highest mountains in the world are the Himalayas; the highest peak, Mount Everest, is fully 29,000 feet high. The mountain peaks of the world whose summits have not been reached (1903) are seven in number, Everest, McKinley, Erebus, Lompobatting, Petermann, Tsiafajavona, and Chydenius.

High mountains exist on the bed of the ocean. A number belonging to the submerged Atlantic continent have been located, and their elevation determined. Some of the most prominent are Mount Chaucer, located in 1850, in latitude 42° 50′, longitude 28° 50′, crest 284 feet from the surface; Mount Sainthill, in latitude 42° 50′, longitude 42° 20′, discovered in 1832, height about 11,000 feet. Another important submarine mountain is the Laura Ethel, discovered in 1878, its crest about 216 feet below the surface. A group of submarine mountains, in latitude 43°, longitude 22° 30′, has been named Edward the Seventh Range. Other Atlantic peaks are Tillotston Bright, Placentia, and some in latitude 45° and longitude 48°. Mount Placentia is only about 30 feet below the surface. Many of the islands of the ocean are mensas or buttes.

The mountains of the world are the great depositaries for the world's mineral weath. The large proportion of the valuable metals in general use in the world have been obtained from the mountains. Mountains affect the climate by protecting from cold winds or by preventing the ocean breezes from cooling the interior of countries in tropical regions, and by controlling in a great measure the rainfall (see Condensation). The flora and the fauna, so dependent upon climate, are modified greatly by the mountains. The elevations are the great water-reservoirs of the world; they store almost the whole supply of water which falls on the earth's solid surface and distribute it in channels throughout the land. Lakes and springs are common in mountains. The vertical land masses of the earth have been most important in determining the history of the world. They are natural boundaries, they have protected the weak from the strong, the civilized from the savage, and many sturdy, powerful races of to-day owe their early preservation in a great degree to the mighty natural barriers which stood between them and a stronger and more ferocious race. The mountains of the world have affected the literature and art of the world, and these influences are still felt wherever a mountain uplifts its crest.

Consult: Reade, 'The Origin of Mountain Ranges'; Willis, Thirteenth Annual Report, U. S. Geological Survey, Washington, D. C. (1893); Russell, Fourth Annual Report, U. S. Geological Survey (1884); Hull, 'Volcanoes'; Judd, 'Volcanoes'; Dana, 'Characteristics of Volcanoes'; Geike, 'Mountain Architecture'; 'Earth Sculpture'; Reclus, 'The History of a Mountain'; Elie de Beaumont, 'Notice sur les Systèmes de Montagnes.'

Mountains of the Moon. See Moon, Mountains of the.

Mount'castle, Clara H., Canadian artist and author: b. Clinton, Ontario, 26 Nov. 1837. Her specialty was landscape and marine views. Under the pen name of "Caris Sima" she has published 'The Mission of Love, and Other Poems' (1882); 'Lost, and Other Poems' (1882); 'A Mystery' (1886), verse; and the novel, 'Crow's Hollow.'

Mounted Police. See Police.

Mourning. In most nations from the earliest ages it has been the custom of bereaved persons to testify their grief for the loss of friends or relatives by some external change of dress and deportment. The eastern nations and the Greeks cut off their hair, the Romans allowed the beard and hair to grow, in mourning. Different colors have been adopted as badges of grief; the ancient Egyptians wore yellow; the Ethiopians, gray; the Roman and Spartan women, white, which is still the color of grief in China, Japan, and Siam; in Turkey, blue and violet; and in the other European countries, black is used for this purpose. Some have attempted to trace the associations by which the colors acquired their character to natural causes; but it must be allowed, with little success. The

Jews, in sign of grief at the loss of their relatives, rent their garments, tore out their hair, and wore coarse garments of a dark color; they went barefoot, neglected their persons, and performed other acts of penance. The term of mourning with them was from seven to thirty days. Among the Greeks and Romans it was the custom to lay aside all ornaments of dress, to abstain from the bath, and all indulgences. The kings of France mourned in violet. Among the ancients, as among the moderns, public mournings were common on the death of the sovereign or of a distinguished public benefactor. The period of mourning differs in different countries, but in all is generally regulated by the nearness of relationship between the survivors and the deceased. In Scotch law a widow has a claim to mournings for her husband where his estate or rank requires mourning in point of decency. Mournings for such of the deceased's children as are to be present at the funeral also form a privileged debt. In the United States the customary period of mourning for widows is one year.

Mourning-cloak. A butterfly. See Camberwell Beauty.

Mourning-dove. See Dove.

Mouse, a small rodent mammal of the family *Muridæ,* the larger members of which are called rats, hamsters, lemmings, voles (qq.v.), etc.; specifically, the house-mouse (*Mus musculus*), originally Asiatic, but universally domesticated. The family is an extremely large one, embracing some 300 well-established species, and is distributed over the whole world except the islands of the Pacific. A mouse is the only mammal of Australia not a marsupial. The members of this family vary in size from some smaller than a house-mouse to the bigness of the American muskrat (q.v.); and exhibit much diversity in form, especially in respect to the limbs, which in woodland and aquatic species are usually of nearly equal size, but in those that dwell on prairies and deserts are far from it, the hind-legs there becoming immensely enlarged and serving as almost the only means of safety (by leaps), while the fore-legs are of little use except as hands in holding the food. It is a characteristic of mice, as of squirrels, to lift the food to the mouth and gnaw it while the animal sits up on its haunches. The pollex (thumb) on the fore feet is a mere wart-like rudiment; but the hind feet have five full toes, and in some aquatic species these are connected by webs forming swimming feet. The skull is shapely, the nose is long, pointed, hairy, keenly sensitive to odors, and protected by remarkably long tactile hairs (whiskers); the eyes and ears are usually large, for these animals are mainly nocturnal in habits; and the teeth are peculiar in that the lower incisors are compressed and pointed, and the molars (usually three on each side) are rootless. The tail in nearly all rats and mice is long, always thinly haired, often naked or scaly, and in such aquatic species as the muskrat is compressed into a powerful sculling oar. Most species burrow or make their homes in holes; a few are arboreal. The nearest relatives of the group are the dormice, mole-rats, jerboas and pouched rats or gophers, a list which shows that the word «mouse» and «rat,» is popularly applied to many small rodents outside the *Muridæ.* This family is divisible into three sections — *Murinæ,* or typical Old-World mice; *Arvicolinæ,* or voles; and *Cricetinæ,* or hamsters, etc.

The first sub-family contains the various rats (q.v.), the house-mouse, the delicate harvest-mouse and more than 100 other species of Europe and Asia, which agree in having wide upper molars marked by three series of tubercles and in other distinctive peculiarities. The house-mouse has been a denizen of men's habitations probably ever since housekeeping began, finding there safety from many natural enemies, opportunities and materials for nest-making, and plentiful daily food. It accompanies mankind wherever he goes, and soon replaces in frontier houses the local wild mice which for a time attempt to imitate its domestic habits. These mice are about three inches long, the tail measuring 1½ inches more. The general color is bluish or dusky brown, but is subject to variation and influenced by climate, food, and other external conditions. Albino or «white» mice, with pink eyes, are kept as pets, also black and piebald ones; and these breeds are easily maintained by selective breeding. Such pets are readily tamed and taught simple tricks. Certain individuals, known as «singing mice,» make, especially at night, a pleasing whistling noise, like feeble chirpings of a canary-bird. The same sound has been heard from wild mice, and is believed to result from an asthmatic condition rather than to be a normal musical utterance. The fecundity of mice is excessive. From six to ten young are produced in a litter, and this species brings forth several times in the year. In about a fortnight the young are able to shift for themselves, although born in a helpless condition. This illustrates how sometimes, under especially favorable conditions, mice may multiply far beyond normal numbers and overrun the country as a devastating plague, instances of which are mentioned under Field-mouse. The two most common European types, the long-tailed brown field-mouse (*M. sylvaticus*) and the diminutive harvest-mouse (*M. minutus*) are farmers' pests, destroying large quantities of grain. The harvest-mouse is one of the smallest of mammals, and constructs a beautiful and elegant little nest of the blades of grass or corn, entwined round and supported by the stalks of the corn or wheat. A similar smaller species in South Africa weighs only a quarter of an ounce. These out-door species hibernate during winter, and lay up an autumnal store of grain in their nests and burrows — a matter in which great diversity of habit exists elsewhere in the family.

American native mice are all of one or the other of the remaining sub-families, or else do not belong to the *Muridæ* at all. The short-tailed meadow-mice (see Field-mouse), the neotomas (see Wood-rat), lemmings (q.v.), and their allies are elsewhere described. The most of our smaller mice belong to the sub-family *Cricetinæ,* characterized prominently by having cheek-pouches, and represented in the Old World by the hamsters. Five genera and about 75 so-called species have been catalogued, but probably further study will greatly reduce the number. *Orychomys* is a rather short-tailed, fossorial genus of the plains region and northern Mexico. *Sigmodon* is another genus of Florida and the Southwest, taking its name from the sigmoid form of the cusps of the molars; *Reithrodontomys* embraces several very small burrowing brown mice of the same region; and *Oryzomys* includes the large, handsome «rice-field mouse» of the Southern States (*O. palustris*). The fifth genus, *Peromyscus,* contains the most numerous and familiar of the long-tailed field-mice. These are the «wood-mice,» «deer-mice» and «cotton-mice,» more familiar under the old name *Hesperomys,* and commonly represented by the white-footed mouse (*P. americanus,* or *H. leucopus*), which occurs all over the more temperate parts of the continent. This species is somewhat larger than the house-mouse, and is yellowish brown above, darker on the back, the lower parts of the body and tail and the upper surface of the feet white; the young are dark slaty; the eyes and ears are large, and the fur long and soft. It is nocturnal in its habits, as active as a squirrel, nesting in trees, in the fields, in barns and houses, and making a dwelling resembling a covered bird's nest; it feeds principally on grain, seeds, nuts, and insects; and in newly settled districts comes into dwellings and granaries and is as mischievous as the house-mouse. Species with similar habits are a beautiful golden-haired southern one (*P. aureolus*); the large, dark-brown, gray-bellied cotton-mouse (*P. gossypinus*), very numerous in the South Atlantic States; the «red-backed» or Michigan mouse (*P. michiganensis*) of the North Central States, and several others.

Consult: Coues and Allen, 'Monograph of the Rodentia' (Washington, 1877); Merriam (and others), 'North American Fauna' (Washington, 1889 and subsequently); Stone and Cram, 'American Animals' (New York, 1902); Ingersoll, 'Wild Life of Orchard and Field' (New York, 1902); and the books of Audubon, Godman, Kennicott, Merriam, De Kay, Baird, Coues, Herrick, and other naturalists.

ERNEST INGERSOLL.

Mouse-bird, or **Coly,** one of the birds of the African corraciiform family *Coliidæ,* which look like big long-tailed titmouses, have soft brown and gray plumage, and creep about the branches or hang underneath them, by aid of bill and claw, like the most acrobatic of parrots. The single genus (*Colius*) contains nine species. The toes are all directed forward, but the hallux, and apparently the outer toe also, may be turned backward; hence the peculiar manner of climbing with the whole metatarsus applied to the branch, a fact which adds greatly to the mouse-like appearance. They feed mainly upon fruit, but take some insects; and they lay their eggs in cup-shaped nests placed in low bushes. Consult Evans' 'Birds' (1900), and writers on African ornithology.

Mouse-deer. See CHEVROTAIN.

Mouse-ear, the name of various small plants, suggested by the shape and appearance of the leaves: (1) a borage of the genus *Myosotis,* more generally known in the United States as «forget-me-not» or sometimes «scorpion-grass,» small furry herbs, growing in damp and shady places through the temperate regions and bearing clusters of minute blue and white, «yellow-eyed» flowers. (2) The marsh cudweed or wartwort (*Gnaphalium uliginosum*); (see CUDWEED). (3) One of the wound-worts (*Stachys germanica*). (4) Any of several chickweeds (q.v.), especially the widely scattered *Cerastium viscosum.*

Mouse-lemurs. See CHIROGALE; LEMUR.

Mouth (oral or buccal cavity), primarily the nearly oval cavity at the commencement of the alimentary canal or digestive tract, into which food is taken, and from which the voice issues. Secondarily the name is applied to the outer orifice of that cavity and to any opening which receives or discharges (in a similar way to the mouth proper) material of various kinds, air, water, gas, etc. Examples are seen in the main opening of a furnace, and that of a fortification, certain openings in wind instruments, the discharging point of a stream, the muzzle of firearms, etc.

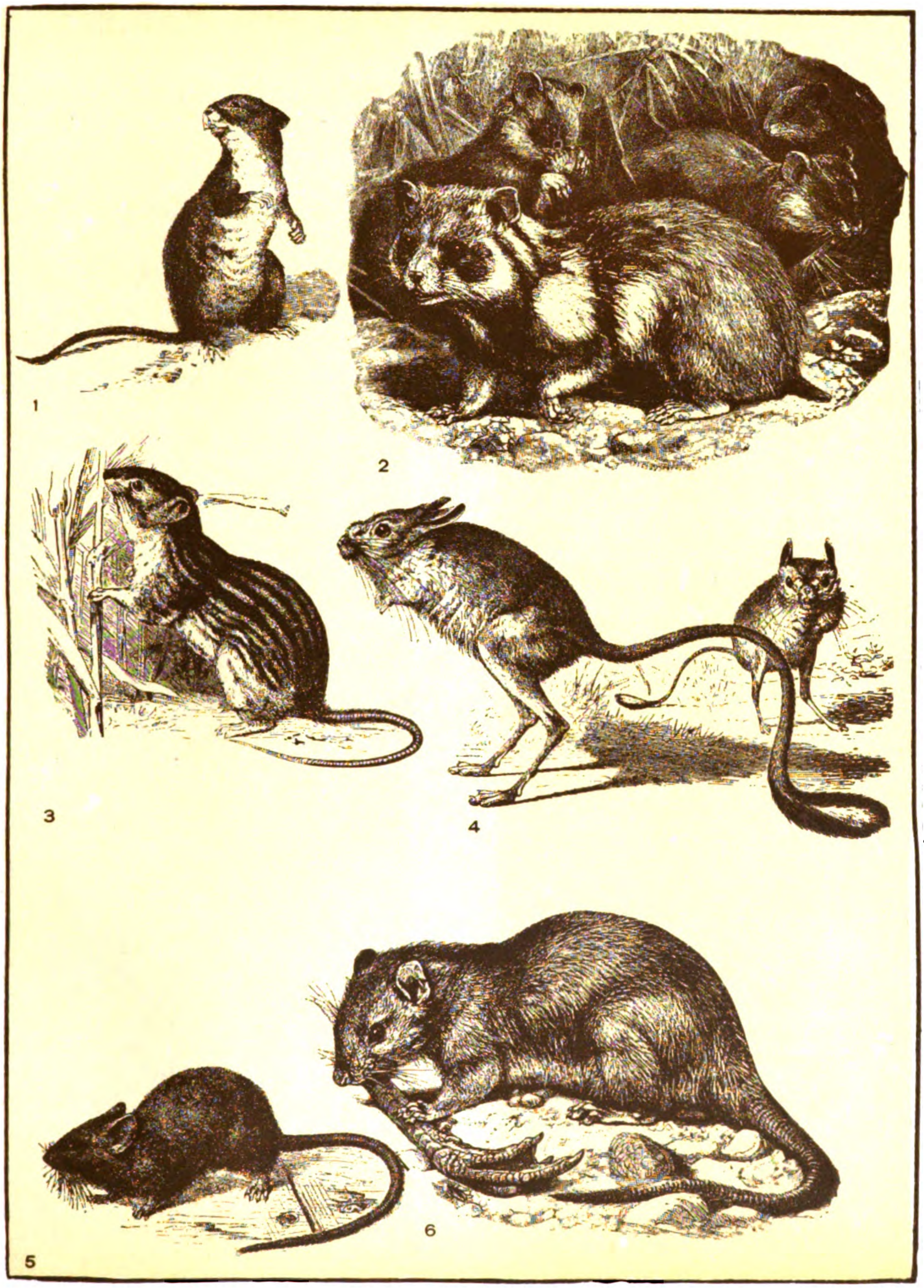
Mouth, Diseases of the. The principal diseases of the mouth may be classified as follows: Inflammation of the mucous membrane and its results; epulis; gumboil; ranula; salivary calculus; and salivary fistula.

Inflammation of the Mouth (*Stomatitis*).— This disorder is usually caused by local irritants, such as scalding drinks, corrosive substances, jagged teeth, or tartar. Suitable remedies are: Cooling and demulcent washes, soft food, building up of the strength, and removal of tartar or other sources of irritation. Inflammation invading the mucous follicles, usually in debilitated children, or from the irritation of teeth, or as the result of an eruption (herpes) is follicular stomatitis. It is attended with thin spots of white exudation, but there is no breach in the surface of the mucous membrane. The patient swallows with difficulty; the mouth is hot and tender; the submaxillary glands may be swollen. The remedies are as above given, with the addition of a disinfectant to the mouth-washes. The terms aphthæ and thrush (q.v.) are given to a stomatitis, usually follicular, attended by curd-like exudations with ulceration beneath the exudates (ulcerative stomatitis). The disease may be conveyed to the nipples of the nursing woman. In true aphthæ the exudations are due to a microscopic fungus, the *Oïdium albicans.* In treatment the child is to be carefully fed, its mouth kept clean and disinfected, and the bowels regulated. Borax, or tincture of myrrh, well diluted, is a good mouth-wash. Do not use honey. Canker refers to isolated superficial ulcerations of the mucous membrane, usually the result of debility and dyspepsia. Remedy these two conditions and touch the spots occasionally with nitrate of silver. Gangrenous stomatitis (noma), or cancrum oris, means a more or less sloughing ulceration, usually upon the gums or cheeks. The breath is fetid; there is great swelling with soreness, high fever, marked debility, etc. It may follow measles or some other debilitating blood-disease. The treatment requires a physician.

Epulis.—This is a smooth round or lobular tumor springing from some portion of the alveolar processes and the periosteum covering them, usually from the lower jaw.

Gumboil.—The gum-disease so named is a circumscribed inflammation of the mucous membrane or of the periosteum covering a portion of an alveolar process, caused usually by a decayed tooth. Wash the mouth frequently with hot

MICE.



1. Harvest Mouse.
2. Hamster.
3. Barbary Mouse.
4. Jerboas.
5. House Mouse.
6. Brown Rat.

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water, have the boil lanced, or cause it to discharge by applications of hot figs (boiled in milk); and have sources of irritation removed.

Ranula.— This term denotes a cystic formation in the mucous membrane beneath the tongue, sometimes originating in the duct of a sub-lingual or submaxillary gland.

Salivary Calculus.— Such is the name given to a concretion, mainly of phosphate of lime, formed in the duct of one of the salivary glands. Sometimes it forms around a foreign body, such as a seed, and sometimes produces a ranula.

Salivary Fistula.— A fistula of this character is an abnormal canal opening upon the cheek, and arising from the duct of the parotid gland as the result of ulceration.

Mouton, moo-tŏn', **Alexander,** American politician: b. Bayou Carencro, La., 19 Nov. 1804; d. near Lafeyette, La., 12 Feb. 1885. He was graduated from Georgetown College, D. C., and in 1825 was admitted to the bar. He was elected to the State legislature in 1826 and in 1831–2 he was speaker. He was presidential elector in 1828, 1832, and 1836, and was elected to the United States Senate in 1837. He was governor of Louisana in 1843–6, and later presided over various conventions, but retired to plantation life at the outbreak of the Rebellion in 1861.

Movement-cure. See Swedish Movement Cure.

Movables. Articles, including live stock as well as inanimate objects, that may be moved from one place to another.

Moville, a township in County Donegal, Ireland, northeast of Londonderry. It is at the entrance of Lough Foyle, and is a calling-place for some of the transatlantic steamers.

Moving Pictures. The growth of the moving picture industry in the United States has been one of the most rapid and important in recent years. The moving picture house has truly come to be the «people's theatre.» To fully appreciate how true this is one must have recourse to figures. The following is a list of the moving picture houses supported by the leading American cities during 1910: New York, 450 theatres, with a seating capacity of 150,000; Chicago, 310 theatres, with a seating capacity of 93,000; Philadelphia, 160 theatres, with a seating capacity of 57,000; St. Louis, 142 theatres, with a seating capacity of 50,140; Cleveland, 75 theatres, with a seating capacity of 22,500; Baltimore, 83 theatres, with a seating capacity of 24,900; San Francisco, 68 theatres, with a seating capacity of 32,400; Cincinnati, 75 theatres, with a seating capacity of 22,500; and New Orleans, 28 theatres, with a seating capacity of 5,600. When it is remembered that all of these houses are filled not once, but four, five, sometimes half a dozen and more times a day some idea can be gained of the vast number of people who attend this form of amusement. To supply the immense public demand for moving pictures requires almost ceaseless work on the part of the producers. The chief combination of producers who control the field for the most part turn out on an average of 20,000 feet of new films each week, at the same time making fully 80 copies of each. The royalties of Mr. Thomas A. Edison from this source amount to about $8,000 a week. The middlemen, or «exchanges» pay the manufacturers $9,000,000 for films, which the former rent at about $18,000,000 a year to the actual exhibitors or showmen. They in their turn collect stupendous sums from the public, all in nickels or dimes. During the year 1909 the paid admissions from 10,000 ticket windows alone amounted to $57,500,000. The audiences which supplied this enormous sum numbered more than two and a quarter million persons per day — a number three times as great as the total of the aggregate audiences of all the regular theatres in America put together. This number, too, is being augmented every day and it is an axiom in the business that «once a moving picture patron, always a moving picture patron.» The facts seem to more than bear this out.

As the moving picture has grown in popularity, the standard of the exhibitions presented has already persevered toward a higher and higher level. Manufacturers and producers alike fully realize the responsibility which is placed upon them in catering to such large audiences, and are striving to make the entertainments they give of real value to their patrons. Time was — and it was not so very long ago, either — when the moving picture constituted a very grave menace to the public morals. The films shown usually depicted murders, suicides, runaways, train robberies, and other grewsome spectacles, which were bound to make their imprint on weak, receptive minds. Murders have been perpetrated which have been directly traced to the influence of this type of moving picture — murders in which every detail as enacted on the screen has subsequently been faithfully followed by the murderer. Fire-bugs have resulted from continued attendance at the old-style moving picture performances. Children have been moved to attempt the methods of the «Black Hand,» and any number of petty criminals and burglars have received the initial inspiration for their crimes while watching the gross, morbid films of the old-style entertainments. Affairs finally came to such a pass that «moving picture show» came to be a synonym for all that was lowest and most debasing in the form of entertainment, and careful mothers guarded their children from moving picture houses as from a plague. To-day all this is changed, however. The best sort of people are regularly seen at moving picture playhouses, while the tremendous influence such resorts wield has been thrown almost entirely toward the advancement of education and inspiration. There is practically no end to the valuable work the moving picture has been made to do, and so fully have its value and its worth been recognized that it has even found its way into churches in several parts of the United States. This great metamorphosis, too, has all come about comparatively recently.

It was at the sincere desire of the moving picture men themselves to remove the ban under which they had been placed by nearly all decent-minded citizens and at the same time make themselves forces for uplift and for good in the world that the first step toward the regeneration of the moving picture business was taken. Their own desire, however, was greatly augmented by an important practical step toward eliminating pictures which were dangerous, and encouraging those that were wholesome. This step was the formation by the People's Institute of New York of the National Board of Moving Picture Censorship. This board is composed of public-spirited men and women, persons of high professional standing, representatives of the municipal government, and of social organizations. The headquarters of the board are located at New York City, which is the centre of the moving picture industry, at least of the manufacturing side of it. Twice each week the committee meets and inspects all the films which are to be sent out for general public exhibition. The board acts in perfect harmony and accord with the main combination of manufacturers, who from the outset of the movement have welcomed the censorship, and at the same time a large number of the independent manufacturers voluntarily submit their own films for the approval of the committee. All this is but one indication of the growing conscience of the moving picture men. No set of films is given out for public inspection until it has been first reviewed and approved by the National Board. As the various films are shown to the committee they are discussed not only with regard to their suggestiveness, but also with a view to their probable influence on the imagination of the weak-minded, the poorly educated, and the ultra-susceptible. Moving pictures reach the young and impressionable portion of the country's population, family groups, and the immigrant contingent, and the censorship of them has to be all the more rigid on this account. All these facts the board takes into consideration in passing its judgment, and no picture which is deemed in any way liable to do harm to the morals or minds of any of the classes who are likely to witness it is allowed to pass. Thousands of dollars worth of films have been cheerfully destroyed by the manufacturers at the suggestion of the board of censorship since the creation of that body. The result is the uniformly clean, wholesale style of moving picture exhibition which are to-day to be witnessed in all parts of the United States.

Out of 2,900 films examined recently by the board of censors no less than 900 were classed as directly educational by those who passed judgment upon them. The rest were for the most part listed as "serious drama" which has a value peculiar to itself. The educational film, however, is popular, both with the public and the manufacturer. In securing the effects produced in these no amount of expense is spared. One manufacturing company, for instance, in order to make a realistic war-time set of pictures, hired the use of an entire railroad in Florida. Another company, in depicting how an evil man came to grief, sent an automobile originally worth $4,000 over a steep cliff. Where historical plays are put on a vast amount of work and expense is lavished that they may be as nearly perfect as possible. Historical accuracy is never sacrificed because of cost involved and the most splendid effects are oftentimes attained through such performances. The value of the historic lessons which are imparted to the audiences through this medium is almost inestimable. Nothing teaches so effective a lesson as actual sight, and this is exactly what the moving picture holds out to the patron. The works of almost all the great masters of literature has been staged in this way by the moving picture machine. All of Shakespeare's plays have been produced thus, and for some of the performances even such celebrated theatrical artists as Mme. Sarah Bernhardt and the late M. Coquelin have lent the aid of their art to the moving picture producers. Probably the finest set of films ever exhibited on any moving picture screen was that illustrating the life of Christ, which was put on at a cost of $10,000. Both from an educational and an inspirational standpoint this possessed great value.

The Government has also made use of the moving picture film in gaining recruits for the navy. This movement began with the exhibition of a few films depicting naval drills, and out of these grew real dramas, showing forth the spectacular side of the middy's life in its most glowing aspect, with a love interest as a rule interwoven. Through witnessing this type of picture, it has been estimated that numerous young men who would otherwise never have conceived of following the sea as a means of livelihood have been induced to enter the United States navy. Travel pictures are also extremely popular and are very widely exhibited. These, too, possess much educational value. All the storied castles and ruins of Europe are depicted on the moving picture screen, the canals of Venice, the glories of ancient Greece, the mysteries of the pyramids and of all ancient Egypt, the natural beauties of Ireland and Scotland, the interiors and exteriors of old, historic cathedrals and fortresses — in fact, every conceivable phase of foreign life, still or active — from which beholders can derive lessons which years of reading, which they would probably never undertake in the course of their lives anyway, could not hope to give. There is scarcely a subject which the thoroughness of moving picture manufacturers has allowed to escape them. Among the educational films presented are included also many unique and interesting phases of geography, botany, etomology, ethnology, surgery, pathology, biology, geology, and bacteriology, while zoölogy, ornithology, microscopy, minerology, metallurgy, and aeronautics, as well as the other subjects before mentioned. Besides embracing all these topics, the moving picture affords an excellent opportunity to a man who has not yet learned to read of keeping abreast the most important events of the world's progress in all lines of endeavor and activity.

Enlarged moving pictures have shown the housewife the action of germs and bacteria on various common household foods, when they are allowed to remain unprotected on kitchen tables, and the work which the films have done through this medium in making for uniformly sanitary conditions in unnumbered homes, and saving lives in consequence is practically incalculable. Recently even the flight of a bullet has been visualized by means of this marvellous science. This was done during 1910 by the fastest moving picture machine which the world has yet seen, an invention of Professor Cranz, private counsellor to the Emperor of Germany and instructor at the Military High School at Charlottenburg. This machine, the details of which its inventor is keeping secret, is known to be capable of six thousand images in the space of one second. In depicting the flight of a bullet it shows the missile leaving the barrel of a revolver ahead of the smoke from the discharge, and finally striking a human bone. It is believed that this set of films will furnish many new details to science on the effects of bullets and projectiles after being discharged. Professor Cranz's machine is also capable of illustrating so minute a thing as the vibrations of the wings of small insects in flight.

In all sections of the United States churches have for some time employed moving pictures in their evening services, and in some of the more spectacular churches the films have been used to illustrate sermons. At first, the movement was taken up by religious organizations in order to combat the pernicious influence of the moving picture houses when they were at their worst by giving in the same form of entertainment improving subjects. Now that the necessity for this has departed, however, the churches still continue moving picture entertainments as a means of popularizing their services, and they not only give films of an improving popular nature, but also illustrate the whole of the Old and New Testaments by this means. Some churches have been criticised by the most conservative elements for this action, but it has proved its own worth in the long run. Many schools have also employed the moving picture as a means of instruction, and great success has attended this custom wherever it has been practiced. An English concern has even gone so far in the perfection of moving pictures as to bring out colored films. By means of the latter the growth of flowers has actually been shown, this feat having been performed during 1910 before the New York Electrical Society. Eminent surgeons are even now seriously considering the teaching of surgery by means of moving pictures. They say that a moving picture of a competent surgeon performing an intricate operation, where his every slightest move could be shown beyond all misinterpretation to the student would prove a more thorough and effective method of instructing in the proper methods of surgery than any number of unillustrated lectures. It now appears highly probable that this form of instruction may become general before a great while, for there is no single field in which the moving picture has made greater strides than in that of medicine. In Oct. 1910, for instance, a series of pictures was put on exhibition in London that had been obtained through the agency of the X-Ray. In these films the stomach of a man was thrown on the screen, and all its regular workings clearly shown. By the same means the workings of the human brain have also been illustrated. The benefit which such pictures will prove to scientific research is undeniable.

And so in all fields the moving picture is to-day doing its work and doing it well. We have no censorship of the drama in the United States as they have in England and some other foreign countries, but we have a censorship of moving picture entertainments, and as a result most people who are in touch with the situation proclaim the moving picture playhouse a clean and wholesome place of popular amusement. The National Board of Censorship is doing its work well. Where it does err, as sometimes happens, public sentiment can be depended upon to come to the rescue, now that the country at large is beginning to awake to the vital importance of the moving picture as an educational and inspirational influence.

And now the latest development — a development which seems destined to gain even more patrons for the moving picture, and to increase its power immeasurably has been brought to perfection by that tireless worker, Mr. Thomas A. Edison. It is moving pictures which can talk. For a number of years, realizing that the moving picture house was probably the greatest educational agency in the land for the great bulk of the working people, Mr. Edison has been working on this invention, with a view to making the entertainments of the people more complete and more helpful. He has at last met with some meed of success. Before a small selected audience at his New Jersey experiment station, Mr. Edison, in August 1910, gave a demonstration of what he has accomplished in this line. He has not yet got it to such a fully developed stage that he is willing to put it to the test of an elaborate public performance, but the first great triumph has been won, and the second therefore should not be far distant. Meanwhile moving pictures are doing their work every day in the year. They are doing that work for 20,000,000 of people each day who pay admissions to the regular houses all over the world, besides the numbers who have the benefits of free exhibitions at schools, churches, and like places. The moving picture house is now fully established, not only as the people's theatre, but as the people's teacher.

Moving Plant, an East Indian leguminous plant (*Desmodium gyrans*), remarkable for the motions of its pinnate leaves. The large odd leaflet becomes more or less horizontal under the influence of light and heat, and is depressed during darkness or cold. Besides the movement of rising and falling, it has also a lateral oscillatory motion, so as to occupy an oblique position relative to the leaf-stalk. The smaller leaflets, of which there are one or two pairs, also exhibit jerking movements, approaching and retiring from each other, and these motions proceed to a limited extent during darkness. Gray describes 20 species of *Desmodium* in the flora of the United States, without mentioning that any of them exhibit such movements.

Mowat, Sir Oliver, Canadian statesman; b. Kingston, Ontario, 22 July 1820; d. 1903. He was educated in Kingston and Toronto, studied law in Kingston and began practice in that city, afterward moving to Toronto. He took high rank in his profession, especially as an equity lawyer, his learning and success bringing him, in 1856, the appointment of Queen's Counsel. From this time until 1859 he served as a member of a commission appointed to revise and consolidate the statutes of Canada and Upper Canada. From 1857 to 1864 he was in the legislative assembly, and in 1858 was provincial secretary. In 1863-4 he was postmaster-general, and in the latter year was appointed to serve in the Quebec Conference, where he was very influential in helping to bring about the Dominion Confederation. It was in this year also that he became a judge of the court of chancery of Ontario, sitting until 1872 when he became premier of the province, a position which he held with conspicuous ability for twenty-four consecutive years. In 1896 he entered the Laurier cabinet as minister of justice and president of the senate. In 1899 he was appointed lieutenant-governor of Ontario. He was knighted in 1892.

Mowatt, Anna Cora. See RITCHIE, ANNA CORA OGDEN MOWATT.

Mowbray, mō'brā, **George W.,** American inventor: b. Lewes, England, 1815; d. North Adams, Mass., 21 June 1891. He studied chemistry in England, came to America in 1853, worked in the California gold-mines until 1858, in the Pennsylvania oil-country until 1868, and then at North Adams, where he perfected the commercial use of nitroglycerin, and invented smokeless powder. He was consulting chemist to the Maxim and Nordenfelt Arms Company.

Mowbray, Henry Siddons, American artist: b. Alexandria, Egypt, 1858. He was brought to the United States in early childhood and educated in North Adams, Mass. He studied one year at West Point. In 1878 he entered the studio of Bonnat, Paris, and subsequently settled in New York as a figure painter and decorator. He is a member of the Society of American Artists, and a National Academician. He was awarded the Clark prize by the National Academy in 1888.

Mowbray, J. P., a pseudonym of Andrew Carpenter Wheeler. See WHEELER, A. C.

Mower, Charles Drown, naval architect; b. Lynn, Mass., 5 Oct. 1875; educated in the Lynn public schools. After serving for four years in the offices of Arthur Bundy and R. B. Crowinshield, naval architects, at Boston, he went to New York to take the position of designing editor of "The Rudder," the yachting magazine. In the seasons of 1903–4 he was official measurer of the New York Yacht Club, measuring the yachts 'Shamrock III' and 'Reliance' for the American cup races of 1903. Is a member of the Society of Naval Architects and Marine Engineers, and of many yacht clubs. Among his works are: 'How to Build a Motor Launch' (1900); 'How to Build a Knockabout' (1901); 'How to Build a Racing Sloop' (1901); 'How to Build a Cruiser' (1903).

Mowrer, Frank Roger, ex-consul-general; b. Xenia, O., 7 July 1870. He received the title of LL.B. at Cornell in 1894 and was admitted to the bar the following year. In 1897 he decided to enter the consular service, which he continued for twelve years, holding many important posts in that period of time. The record of his service is as follows: Marshal of the consular court at Yokohama 1897–9, from which he retired by operation of the treaty; marshal at Canton, 1899–1900; consul at Antigua, from Jan. to Oct. 1901; at Ghent, Belgium, 1901–6; consul-general at Abis Ababa, Abyssinia, 1906–7; consul at Leghorn, Italy, from Apr. to June, 1907; consul-general at Copenhagen, Denmark, 1907–9, from which he resigned in the latter year and returned to the United States.

Mower, mō'er, **Joseph Anthony,** American soldier: b. Woodstock, Vt., 22 Aug. 1827; d. New Orleans 6 Jan. 1870. He was educated in the common schools, enlisted as a private in the Mexican War and in 1855 was commissioned 2d lieutenant. He was promoted captain in 1861 and for bravery in action was made brigadier-general in 1862 and in 1863 commanded a brigade at Vicksburg. In 1864 he was in charge of a division under General Banks in Louisiana and he accompanied General Sherman in his Georgia and Carolina campaigns and received promotion to the rank of major-general. He remained in the army after the war and was in command of the department of Louisiana at his death.

Mowry, mō'rĭ, **William Augustus,** American educator and author: b. Uxbridge, Mass., 13 Aug. 1839. He was educated at Brown University and in 1862–3 was a captain in the Federal army. He was principal of the English and Classical school in Providence in 1864–84 and in 1884–5 edited the 'Journal of Education.' In 1886–91 he was editor of 'Education,' and since 1887 has been president of the Martha's Vineyard Summer Institute. Among his writings may be mentioned: 'Nathaniel Mowry and His Descendants' (1878); 'Richard Mowry: His Ancestors and Descendants' (1878); 'Studies in Civil Government' (1887); 'Elements of Civil Government' (1890); 'Talks with My Boys' (1892); 'A History of the United States' (1896); 'The Uxbridge Academy: a Brief History' (1897); 'First Steps in the History of Our Country' (1898); 'American Inventions and Inventors' (1900); 'Marcus Whitman and Early Oregon' (1901); 'The Territorial Growth of the United States' (1902); 'American Heroes and Heroism' (1903); 'American Pioneers' (1905); genealogical works, etc.

Moxa, the down of a Chinese plant, used in medicine. In preparation for medical use it is a small cone of inflammable matter, used in Eastern countries as a cure for the gout or any deep-seated pain, and is administered by burning it on the skin; a small mass of combustible vegetable matter employed for effecting cauterization. This peculiar form of counter-irritation was early practised in the East, particularly by the Chinese and Japanese, from whom it was learned by the Portuguese. One or more small cones, formed of the downy covering of the leaves of *Artemisia moxa*, or of the pith of various plants (as of the common sunflower), or of linen steeped in niter, are placed on the skin over the affected part, and the ends remote from the skin are ignited. The combustion gradually proceeds through the cone and forms a superficial eschar on the skin. The surrounding parts are protected by a pad of wet rag, with a hole in it for the moxa.

Mox'om, Philip Stafford, American Congregationalist clergyman: b. Markham, Canada, 10 Aug. 1848. During the Civil War he served as "captain's boy" (1862), then enlisted in the Illinois cavalry in 1863, and served till 1865. At the close of the war he entered upon a course of study at Kalamazoo College, Mich., and later studied at Shurtleff College, Ill. (1868–70). Being ordained to the Baptist ministry in 1871, he studied at Rochester Theological Seminary from 1875 to 1878, and was graduated from Rochester University in 1879, with the degree of A.B. From 1879 to 1885 he was pastor of the 1st Baptist Church of Cleveland, Ohio; and from 1885 to 1893 at the 1st Baptist Church of Boston, where he gained a reputation as a preacher of marked power. In 1894 he joined the Congregationalists and became pastor of the South Congregational Church at Springfield, Mass. From 1894 to 1897 he was university preacher at Harvard, and has preached frequently at other universities and colleges. He was at the World's Parliament of Religions, and presented a paper on ‘Immortality’; he was also at the World's Peace Congress, and has been delegate to several international peace congresses. He has written ‘The Aim of Life’ (1894); ‘From Jerusalem to Nicæa, the Church in the First Three Centuries’ (1895); and ‘The Religion of Hope’ (1896).

Moyobamba, mō-yō-bäm'bä, or **Moyabamba,** Peru, capital of the department of Loreto, on the Mayo River, 120 miles east of Chachapoyas. It is noted for its manufactures of Panama hats. It occupies an isolated position on a gravelly plateau intersected by deep ravines. Its chief communication is by river with Brazil, the Mayo as an affluent of the Hualaga connecting with the Amazon. Pop. (est.) 10,000.

Mozambique, mō-zäm-bēk', South Africa, a Portuguese territory on the east coast, separated from Madagascar by the Mozambique Channel. It extends for about 1,300 miles from Cape Delgado to Delagoa Bay, and inland is bounded chiefly by British territory and the Transvaal. It received from the Portuguese the name of the State of East Africa (see East Africa, Portuguese), and is divided into three provinces, Mozambique, Lorenzo Marques and Zambesi. The whole territory is under a commissioner appointed for three years, part of it is administered by the Mozambique Chartered Company. The area is estimated at about 295,000 square miles. The coast is generally low, beset with reefs and small islands, and possessed of very few good harbors. This, together with the sand-banks, shallows, currents, etc., renders navigation at all times dangerous. Much of the coast district is barren or swampy, though here and there fertile cultivated tracts occur. Inland rises a broad plateau, with groups and chains of mountains running mostly parallel to the coast, and nowhere reaching a great height. The climate is excessively hot, and except on the elevated regions, unhealthful. The flora and fauna peculiar to Africa are here found in the greatest richness. Most tropical fruits thrive; cotton succeeds well; and the forests produce valuable woods. Elephants, rhinoceroses, hippopotami, buffaloes, etc., are abundant. In language the native population belongs to the great Kaffir family. The trade is now growing to some importance, the chief seats being Mozambique, Quilimane, Beira, and Lorenzo Marques. From the last two a railway runs inland. The town of Mozambique is situated upon a small coral island near the coast. It has the governor's palace, two churches, a hospital, a prison, warehouses, etc. The harbor is secure. Pop. 8,000. The principal exports are ivory, india-rubber, ground-nuts, copal, wax. Though Mozambique has belonged to the Portuguese for centuries, they have done little for the development of its resources. Population estimated at from 800,000 to 1,500,000.

Mozambique Channel, the passage between the east coast of Africa and the island of Madagascar, about 1,050 miles long from northeast to southwest, 530 miles wide at its southern entrance, about 250 miles wide in the centre, and nearly 600 miles wide at the northern entrance, where lie the Comoro Islands. The harbors of Mozambique and Beira are on its west shore.

Mozar'abic Liturgy, the liturgy used by the Mozarabs, or «spurious Arabs,» that is, the Christians who submitted to the Moorish government, in Spain, while retaining their own religion. This office is sometimes styled «Officium Gothicum» or «Isidori Missale,» because it was in vogue during the Gothic domination and was first revised by the great and learned Isidore of Seville in the 6th century. In Toledo after the gradual adoption of the Roman missal throughout Spain during the 11th and 12th centuries, Ximenes, cardinal archbishop of the see, revised the ancient office (1285) and built the beautiful chapel at the west end of the Cathedral where the old Gothic ritual is still observed. It is supposed from the Greek affinities of its form, that the original liturgy was brought from Asia Minor by the Goths who dwelt south of the Bosporus in the 5th century.

Mozart, mō'zärt (Ger. mō'tsärt), **Johannes Chrysostomus Wolfgangus Theophilus,** Austrian composer: b. Salzburg, Austria, 27 Jan. 1756; d. Vienna 5 Dec. 1791. With this somewhat harsh combination of names Mozart was baptized on the day following his birth. His parents were Johannes Georg Leopold Mozart, and his wife Anna Maria.

Until 24 years of age Mozart led a wandering life, being taken on several tours by his father, who, while himself fully appreciating the child's genius, chafed under the continuous disappointments resulting from the fact that it was not productive either of the appreciation or financial returns which it so richly deserved. But later the musical world recognized his powers, nor has there since his death been any stint of praise for his marvelous achievements. Mozart's genius was not merely the brilliant flash of a meteor, dazzling the world for a brief moment and then gradually flickering out. He did not earn his title of «musician of musicians» through one sublime effort in early life. Of him, perhaps more than of any of the other great composers, it may be truly said that his powers steadily increased as he grew older, a statement borne out by the fact that three of his greatest works were composed during the last year of his life.

Nor is this high estimate of his worth confined to those of the laity who since his time have been capable of appreciating his wonderful genius. All men, including his fellow artists, paid sincere homage to him as supreme in several of the departments of the musical art. Thus Rossini, on being asked who was the greatest musician, first replied «Beethoven»; but when the question was put «What of Mozart?» he answered «Mozart is not the greatest, he is the only musician in the world.» Again, Gounod in an address before the Académie des Beaux Arts in 1882 expressed his deep admiration for Mozart in the following words: «Oh, divine Mozart, . . . bounteous nature had given thee every gift; grace and strength, fulness and sobriety, bright spontaneity and burning tenderness, all in that perfect balance which makes up the irresistible power of thy charm, and which makes of thee the musician of musicians, greater than the greatest, the only one of all.»

This sounds like high praise, and that was what Gounod meant it to be. And so throughout the ages men will continue to recognize the genuine fire of genius which animated his compositions, and which found its expression not only in his inimitable perception of the relation between the human feelings and the realm of tones, or in his inexhaustible power of interpreting widely different types of character, but above all in the superb beauty of proportion and balance which pervades his creations. Mozart was not only a brilliant composer, however, for he was also a remarkable performer on the piano, organ and violin. Haydn said that he could never forget Mozart's playing, for «it went to the heart.»

The number of separate published works ascribed to Mozart is 626, while he is also said to have written 294 compositions which were unfinished or unpublished. When only 3 years old Mozart showed evidences of his musical genius, perceiving which his father taught him minuets on the harpsichord, and at 4 years he commenced composing. His first appearance in public was in September 1761, as a chorister in some theatricals held at the University of Salzburg. In his 6th year he composed his first published work — a 'sonata pour claveçin.' When 7 years old the Mozart family visited Paris, Wolfgang playing the violin and organ at several churches *en route*. Here he composed a Kyrie, his first sacred piece. Later in the year they went to London, where the boy's playing, and especially his power of improvising, excited the greatest admiration. In 1764, while in London, he produced 10 sonatas for the clavier and violin, six of which, dedicated to the Queen, were brought out early in the following year. In January 1766, Wolfgang gave two concerts in Amsterdam, at which all the instrumental work was of his own composition. Later, on the occasion of the installation of the Prince of Orange as stadtholder, he composed a concerto named 'Galimathias musicum.' After several months of travel the family returned to Salzburg in November. Here they remained till September 1767, Wolfgang devoting himself to study and composition. He composed a part of a sacred cantata for the archbishop of Salzburg, a Passion-cantata, his first concertos for the piano, and a Latin comedy, 'Apollo et Hyacinthus.' In September he was again in Vienna, his father being attracted there by the approaching betrothal of the Archduchess Josepha to King Ferdinand of Naples. Here much jealousy and intrigue was displayed, and although Mozart composed an opera, 'La Finta Simplice,' at the request of the Emperor, it was not given a performance. Mozart, however, had the satisfaction of producing privately his operetta entitled 'Bastien und Bastienne.' He also composed an offertorium and a trumpet concerto to be used at the consecration of a new church at the Waisenhaus.

After the return of the family to Salzburg Mozart was in 1769 appointed Concertmeister, and a performance of 'La Finta Simplice' was then arranged. He next composed two masses, and the Johannes Offertorium for a priest in the monastery at Seeon. Preparations were now made for a tour of Italy, the family arriving at Milan at the end of January 1770. While in Rome he visited the Sistine Chapel to hear Allegri's 'Miserere.' On his return he wrote down the entire work from memory, a feat which did much to spread his fame abroad. They next visited Naples where his concerts were brilliantly attended. In Bologna he was honored by election to the 'Accademia dei Filarmonicci,' his test piece being an antiphon for four voices, which he composed in about half an hour.

His first opera 'Mitridate Rè di Ponto' was composed and produced in Milan, where it was performed 20 times. In Padua, on his way home, Mozart was commissioned to compose an oratorio, perhaps 'Betulia Liberata,' which was first performed in Lent, 1772. His stay at home was brief, for his friend Count Firmian, who had met him when in Milan, commissioned him to write a dramatic serenata to celebrate the nuptials of Archduke Ferdinand with Princess Maria of Modena. On 17 Oct. 1771, the performance of 'Ascanio in Alba' was given with very gratifying results. The next month saw Mozart in Milan again and hard at work on his opera 'Lucio Silla,' which was at length produced at the Milan opera house with great success. On reaching home Mozart composed four symphonies, three divertimenti for a wind orchestra, a grand concerto for two violins, and a mass, and in the following year two masses, a grand litany, two vesper psalms, an offertorium, a bassoon-concerto, four symphonies, two serenatas, etc. The next visit was to Munich where young Mozart was engaged to compose an opera for the carnival of 1775, and on 13 January 'La Finta Giardiniera' was produced. From that time to September 1777 Mozart, now a young man of 21, devoted himself to composing, and the list of his pieces is very extensive. Later in the year he visited Mannheim with his mother, and while there had his first love affair, the young lady being Aloysia, second daughter of Fridolin Weber, a prompter and copyist. His father on hearing of it, ordered them away to Paris, where they arrived in March 1778. Here he composed several pieces, including a gavotte, a quartette for flute and strings, and some parts of a 'Miserere,' which were produced without even the mention of his name. On 3 July of this year his mother died. Again we find him in Salzburg in mid-June 1779, during which year he wrote the music to Gebler's drama 'Kônig Thamos,' the operetta 'Zaïdé,' several sonatas dedicated to the Electress of Bavaria, an aria for Aloysia Weber, whose love for Mozart had, however, grown cold, and a number of minor pieces for which he had received commissions. His first great opportunity came in 1780 when he received orders to furnish an opera for the Munich carnival. It was entitled 'Idomeneo, Rè di Creta,' and had its first performance on 29 Jan. 1781. Mozart now received a summons to Vienna from the archbishop, who, however, seems to have treated him as a menial. Finally severing his official relations, he took lodgings with the Webers. During the summer he wrote an opera for the National Singspiel (German) founded by the Emperor in 1778, and in spite of many obstacles 'Entführung aus dem Serai' was produced by the Emperor's express order on 16 July 1782. A month later he made Constance Weber his wife.

Mozart's marriage seems to have brought with it a succession of difficulties. Constance was a poor manager, and Mozart was as yet without any fixed appointment. He gave a series of subscription concerts which were well attended, and during six weeks played at 17 concerts besides five of his own arranging. In July 1783 he took his wife to Salzburg to present her to his father, and in August produced a mass in the Peters Kirche, which he had composed in honor of his wife, who sang the soprano part on that occasion. During the latter part of 1785 Mozart was engaged on one of his masterpieces, an opera based on Beaumarchais' comedy entitled 'Le Mariage de Figaro.' The first public performance of the opera ('Le Nozze de Figaro') took place on 1 May 1786, and the triumph of the composer was complete. In 1785 Mozart wrote 'Davidde Penitente' for the Society of Musicians, and some music for the vaudeville piece 'Der Schauspiel-Direktor' was also produced. In 1787 Mozart and his wife visited Prague in response to an invitation from Count Thun. Here it was decided that he should compose another opera, which he did for the small sum of 100 ducats. 'Don Giovanni' was the result, and its first performance was given on 29 Oct. 1787. Returning to Vienna in November, he was appointed Kammer-compositor with a salary of 800 gulden.

The year 1788 was a very busy one for Mozart. In six weeks he wrote his three last and finest symphonies (in C, E flat and G minor), as well as several pieces for the piano, arranged five fugues from Bach's Wohl-temperirte Clavier for string quartette, and added wind parts to Handel's 'Acis and Galatea,' 'Messiah,' 'Ode to St. Cecilia's Day,' and 'Alexander's Feast.' In 1789 Mozart was offered the post of Kapellmeister at the Prussian court. The salary was 3,000 thalers, but in spite of the comforts which this comparatively large income would have insured, Mozart declined rather than forsake his «good Kaiser.» Arriving in Vienna on 4 June, and being in much trouble, partly on account of his wife's constant illness, he informed the Emperor of the offer of the King of Prussia, and tendered his resignation. The Emperor exclaimed: «What, Mozart, are you going to leave me?» Mozart replied, «Majesty, I throw myself upon your kindness — I remain.» The Emperor then ordered him to compose a new opera, which under the title 'Cosi fan tutte,' was produced on 26 Jan. 1790.

During the last year of Mozart's life, as already stated, he composed three of his greatest works, two of which must be always reckoned among the highest of musical creations, namely, the opera 'Die Zauberflöte,' and the 'Requiem,' which latter he was commissioned to compose under very mysterious circumstances. Mozart's health had now become much impaired and he was greatly depressed. He believed that he was writing this 'Requiem' for himself. The third notable composition of this year was the opera 'La Clemenza di Tito,' composed for the coronation of Leopold II. at Prague, which took place 6 September, the opera being performed on the same evening. His recent exertions and excitement proved too much, however, for his remaining strength, and on 5 Dec. 1791, he died of malignant typhus fever. He was buried in a pauper's grave in the churchyard of St. Marx.

Consult: Niemtschek, 'Leben Mozarts' (1798); Nissen, 'Biographie W. A. Mozarts' (1828); Holmes, 'Life of Mozart including his Correspondence' (1845); Jahn, 'Das Leben Mozarts' (1856–9, translated by Pauline D. Townsend, 1882); Oulibischeff, 'Mozarts Leben und Werke' (1859); Von Rochel, 'Kritisches chronologisch-thematisches Verzeichniss sämmtlicher Tonwerke W. A. Mozarts' (1862, and with supplement, 1877); 'Mozart's Letters 1769–1791,' translated by Lady Wallace (1865); Pohl, 'Mozart und Haydn in London' (1867); Von Wurzbach, 'Mozartbuch' (1869); Nohl, 'Life of Mozart,' translated by Lalor (1877); Nohl, 'Mozart nach den Schilderungen seiner Zeitgenossen' (1880); Nottebohm, 'Mozartiana' (1880); Beyle, 'Vies de Haydn, de Mozart et de Metastase par de Stendhal' (1887); Jahn, 'W. A. Mozart' (1889–91); Elson, 'Great Composers and their Work' (1898); Grove, 'Dictionary of Music and Musicians,' Vol. II., pp. 379–406 (1898); Buel (edited), 'The Great Operas' (1899); Hubbard, 'Little Journeys to the Homes of Great Musicians,' Vol. I. (1901); Breakspeare, 'Mozart' (1902).

R. I. GEARE,
National Museum, Washington, D. C.

Mozart, mō'tsärt or mō'zärt, **Leopold**, German composer: b. Augsburg, Bavaria, 14 Nov. 1719; d. Salzburg 28 May 1787. He became Kapellmeister to the archbishop of Salzburg. He wrote voluminous amounts of music, and published a justly famous 'Violin School' (1756), the first theoretical and practical guide to that instrument, and long the only one. It passed into numerous editions.

Mozoomdar, mō-zoom'där, **Protap Chunder**, Hindu reformer: b. Calcutta, India, about 1840. He joined the association of the Brahmo-Somaj (q.v.) organized for the purification of Brahmanism, and edited at Calcutta the 'Theistic Quarterly Review' and the 'Interpreter,' published by that organization. In 1874 he visited England and in 1883 the United States, being received with honor by leading men of both nations. In 1893 he made a second visit to the United States to attend the World's Parliament of Religions, before which he read a paper on the Brahmo-Somaj. He has written 'The Oriental Christ' (1883); 'Life and Teachings of Keshub Chunder Sen' (1887), and articles for English and American periodicals.

Much Ado About Nothing, a comedy by Shakespeare first played in 1597–8 and published in 1600. The outline of the serious portions of the drama the poet took from Bandello, through Belleforest's translation; the comic scenes are all his own. Bandello presumably borrowed his incidents from the narrative of 'Ariodante and Ginevra' in the 'Orlando Furioso' of Ariosto.

Mucic Acid, $C_6H_{10}O_8$, an organic acid formed by oxidizing milk sugar, or galactose, gum arabic and certain other substances, by the action of nitric acid. It crystallizes in colorless tablets which are insoluble in alcohol, slightly soluble in cold water, and rather freely soluble in boiling water; though when boiled with water it becomes converted into an isomeric substance known as "paramucic acid." Mucic acid melts at about 410° F., does not reduce Fehling's solution, and combines with ammonia and with metallic and organic bases to form an extensive series of salts.

Mu'cilage, a solution of gum in water. In chemistry, the gum of seeds and roots. The name is also given to commercial adhesive gum made from gum arabic or dextrin. Mucilages, in pharmacy, are water preparations of substances dissolved in water, used to suspend insoluble ingredients or to bind them together in a mass.

Mucin, an albuminous proteid substance, which is an important constituent of the connective tissue of the animal body, and which gives to the mucous membranes their characteristic sliminess. It may be isolated by extraction with lime water (or with pure water), and subsequent precipitation with acetic acid, in excess of which mucin is insoluble. Mucin is not precipitated by heat nor by tannic acid. It is, however, precipitated by alcohol, or by saturating its solution with common salt, or with magnesium sulphate. When boiled with strong sulphuric acid, mucin yields leucine and tyrosine.

Mucius Scævola. See SCÆVOLA.

Mücke, Heinrich, German painter: b. Breslau 9 April 1806; d. Düsseldorf 16 Jan. 1891. He became the pupil of Schadow in the Berlin Academy in 1824 and followed him to Düsseldorf in 1826. He was commissioned by the Count Spee to fresco the Castle of Heltorf with scenes from the life of Frederick Barbarossa, and on the completion of this work set out on his student travels through Italy (1833). On his return he painted numerous religious and historical pictures, and furnished illustrations for certain *éditions de luxe* of standard authors. His principal works are 'Saint Catharine Carried by Angels to Mount Sinai' (1836); 'Saint Elizabeth of Hungary Distributing Alms' (1841), both in the Berlin Museum; 'Dante Reciting the Divine Comedy'; 'The Madonna and Child with David'; 'John the Baptist and Saint Aloysius,' a fresco in Saint Andrews Church, Düsseldorf; 'The Storming of Jerusalem by Godfrey de Bouillon'; 'The Introduction of Christianity into Wüpperthal,' a fresco in the town hall at Elberfeld; 'Scenes from the life of Saint Meinhard, Count von Zollern,' in Sigmaringen, over the tomb of Prince Anton von Hohenzollern; 'Christ on the Cross,' a large altar-piece in Marienberg; 'The Good Shepherd,' altar-piece in Kaiserswörth; 'Lurlei'; 'Ecce Homo'; etc. He also produced some water colors and designs illustrating the legends, historic incidents, and folk-lore of the whole Rhine valley. From 1844 to 1868 he was teacher of anatomy in the Düsseldorf Academy.

Mucker, nickname of certain mystic fanatics who were thus popularly derided as "canting hypocrites." The adjective is of ancient origin and did not connote a specific sect until it was applied to the followers of Johann Heinrich Schönherr in Königsberg. See EBELIANS.

Mucora'ceæ, the moulds. See FUNGI.

Mucous Membrane. The mucous membranes line passages and cavities which communicate with the exterior of the body, where they become continuous with the skin. They constitute the lining of the alimentary canal or tract, which begins at the mouth and ends at the anus, a distance of about 27 feet, and is the passage through which the food for nutrition of the body is introduced, digested, and taken up for the preservation and health of the body. They also form the lining of the nose, the throat, the eyes, and of the respiratory apparatus, which comprises the lungs, the windpipe or trachea, and the larynx, together with the chest and the appropriate muscles.

The lungs or lights are two large spongy organs, permeable by air, and are contained within the chest, the heart lying between them. They are the essential organs of respiration, and are two in number, one placed in each of the lateral cavities of the chest. Each lung is conical in shape, and has an apex, a base, two borders, and two surfaces. The right lung, the larger, has three lobes; the left, two lobes. The trachea or air-tube is a cylindrical tube about 4½ or 5 inches in length, from ¾ inch to 1 inch in diameter, and is always greater in the male than in the female. It divides into two bronchi, one for each lung. The right bronchus is wider, shorter, and more horizontal in direction than the left, and is about an inch in length; the left bronchus is nearly two inches long and more oblique in position. From the bronchi branch the bronchial tubes, which are distributed throughout the lungs, and the entire apparatus is lined with mucous membrane. The kidneys, the ureter, the bladder, the testes and the urethra in the male, and the ovaries, Fallopian tubes, womb, vagina, and vulva of the female are all lined with mucous membrane, together with the membrane of the ducts of glands which open upon it. The surface of the mucous membranes of the body is subjected to the contact of various matters, such as the food, the air, and the different glandular secretions and excretions. They are protected from undue irritation by a viscid liquid called mucus (q.v.), which constantly bathes their surface, and are also well supplied with blood-vessels and nerves. They are attacked by many forms of disease, all of which may be cured by prompt treatment.

Mucus, a semi-fluid substance, of a viscid, tenacious character, produced by the various mucous membranes of animals, and found covering the exposed surface of such membranes. Thus it is produced in the mucous membrane lining the nose, the mouth and throat, the gullet, stomach, large and small bowel, the air-tubes of the lungs, the kidneys, ureter, and bladder, the gall-bladder, the ducts of glands, the bile-ducts, etc. In all these situations it serves to lubricate the membrane over the surface of which it is spread, and to protect the delicate surface from the action of irritating agents. Its viscid character prevents it being readily removed, and thus enables it more effectually to discharge its protective function. It is to be noticed that many of the mucous membranes have special glandular structures embedded in them, which produce special secretions, not mucus, such as the mucous membrane of the stomach and bowels, whose secretions have special properties connected with the digestion of the food. The saliva from the mouth is a mixture of mucus and the special secretion from the salivary glands, which acts on the starchy elements of food. Other mucous membranes have no such special structures, and only mucus is secreted by them, such as the mucous membrane of the nasal passages. Mucus is secreted by glands situated deep in the mucous membrane, and such glands are found in the mucous membrane of the nose; similar glands of very minute form are found scattered thickly in the mucous membrane of the mouth, and are found of considerable size in the back part of the tongue, in the gullet, and other situations. But mucus is also produced by single epithelial cells, lining mucous membranes. The form of epithelial cell called the «goblet cell» is believed to be a mucous-secreting cell, and it is found in large numbers lining the mucous membrane of the air-passages, the stomach, and bowels. So that by their agency the special digestive secretions of stomach and intestines contain a large admixture of mucous material. Pure mucus is transparent, but it is usually turbid from the presence of foreign materials, and epithelial cells from the secreting membrane. Its chief ingredient is mucin, a derivative from albuminous bodies, consisting of carbon, hydrogen, oxygen, and nitrogen, but, unlike albumin, containing no sulphur. It is held in suspension by water, forming an opaque liquid, but is not dissolved by it. Besides mucin, mucus contains small quantities of proteid substances and salts, chiefly common salt. Water constitutes nearly 94 per cent of its bulk. From fluids containing it in suspension, such as bile, it may be precipitated in a flocculent stringy mass by alcohol. Heat does not coagulate it; and it is dissolved by weak solutions of alkalies and alkaline earths.

Mud Bath, in which the body is immersed in mud. At Eger, Bohemia, black mud is heated to a temperature of 100°. It contains sulphate of soda, iron, lime, alumina, and ulmic acid. The body is immersed for 15 minutes, after which the patient goes into water to remove the mud. Such a bath may be of use in chronic skin diseases, rheumatism, gout, etc.

Mud-buffalo, a name, in the leather trade, for the Indian buffalo (*Bos bubalus*) as found in a wild or semi-wild condition in the Malay Peninsula, where they frequent swamps and are shot for the sake of their hides. These hides are not tanned, but are sent green to India, Europe and America to be used in the making of loom-pickers, mallets, gears, and other tools used in cotton-milling. They become harder than wood, and are tougher and more elastic.

Mud-cat. See CATFISH.

Mud-eel, the mud-puppy. See PROTEUS.

Mud-fish, the name of various fishes found in muddy water, or fond of burrowing in the ooze of swamps. The Nile bichir and its relatives, the reed-fishes (q.v.) of the sluggish African rivers, are so called; also the lepidosiren and other dipnoans, which grovel on muddy bottoms. In the United States, the name belongs to some small mud-minnows (q.v.), and to a curious fish (*Amia calva*) of the Mississippi Valley, known as dogfish, bowfin and by various other names. This, like the other mudfishes mentioned, is a lone survival of a group of remote origin and large importance in past ages, allied to the ganoids. It is a rather shapeless, dark-colored, exceedingly hardy fish, reaching a length of two feet and a dozen pounds in weight. It is carnivorous, feeding voraciously upon crayfish, small mollusks and anything it is able to seize and swallow; and it greedily seizes a baited hook and then fights gamely for its life, so that it is a favorite with anglers, though hardly fit to eat.

Mud-hen, or **Marsh-hen,** a sportsman's name for any of several rails, gallinules, coots and similar birds which make their home in marshes; it is most often given in the North to the gallinule (*Gallinula galeata*), a bird of the rail family, much like the British water-hen (*G. chloropus*), and common in the marshes about the Great Lakes and Mississippi Valley, where its cluckings resound in summer from every reedy marsh. It is about a foot in length, olive-brown on the back, dull black on the under parts and with a red bill. It is migratory; but the Southern States have a smaller and more handsome mud-hen in the resident purple gallinule (*Ionornis martinica*).

Mud-minnow, or **Dogfish,** one of the small fresh-water carnivorous fishes of the family *Umbridæ,* related to the pikes, and to the Alaskan blackfish (*Dallia*). It lives in muddy bayous, and among weeds at the bottom of clear but sluggish streams, often burrowing in loose mud. There are two North American species: *Umbra limi* of the interior, and *U. pygmæa* of the eastern coast; and one in Austria. Such a distribution increases the probability that this is of «an archaic type, characteristic of some earlier fish-fauna.» The mud-minnows reach a length of about four inches and are valued as live bait, since they will long endure with vigor impalement on the hook.

Mud-puppy, or **Water-dog.** See PROTEUS; for its development and metamorphoses, see EMBRYOLOGY.

Mud-shad, the hickory or gizzard shad (q.v.).

Mud-skipper, a minute tropical fish of the goby family and genus *Periophthalmus,* which is accustomed to go ashore and skip about the space between tide-marks, exploring the rocks, roots of trees, etc., for food, and skipping about like grasshoppers. Some curious qualities distinguish these little creatures, which are found from West Africa to Japan, and make them highly interesting to naturalists. Consult Day's ‹Fishes of India› (1878) and other works on the natural history of the Eastern seas.

Mud-turtle, or **Mud-tortoise,** any fresh-water turtle usually found in muddy places. In the United States, the ordinary mud-turtle is *Cinosternon pennsylvanicum,* which has a grayish-brown smooth shell, and a dark-colored head, with light dots. See BOX-TURTLE.

Mud-wasp, one of the many kinds of solitary wasps which fabricate out of wet clay cell-like receptacles, variously shaped and placed, in which to store their eggs and the provision for the larvæ. See WASP.

Mud'dock, Joyce Emmerson, English journalist and author; b. Southampton, England, 28 May 1843. He has been connected with several London journals and beside publishing some 30 volumes under the *nom de guerre* of «DICK DONOVAN» is the author of many other works, among which are: ‹Basile the Jester›; ‹The Great White Hand›; ‹Fair Rosalind.›

Mudge, Enoch, American Methodist clergyman: b. Lynn, Mass., 28 June 1776; d. 2 April

1850. He became an itinerant clergyman of the Methodist Church in 1793, and in 1793–9 traveled on his duties about Maine until hardships affected his health, and he was settled at Orrington (1799–1816). During this period he was twice elected to the legislature, where he obtained the repeal of a law imposing a tax on other denominations for the benefit of the Congregationalists. Having resumed itinerancy in 1816, he was stationed at Boston, Lynn, Portsmouth, Newport, and other places. From 1832 until his retirement from active life in 1844, he was pastor of the Seamen's Chapel at New Bedford. He was a member of the Massachusetts constitutional convention in 1819. He contributed much to the press, and published in book-form: 'Camp-Meeting Hymn-Book' (1818); 'Notes on the Parables' (1828); 'Lynn,' in verse (1830); and 'Lectures to Seamen' (1836).

Mudgtahids. See MOHAMMEDANISM.

Mudie, mū'dĭ, **Charles Edward,** English publisher: b. Chelsea, England, 1818; d. London, England, 28 Oct. 1890. He engaged in business as a bookseller and in 1842 established his famous circulating library in England which in 1864 he formed into a limited company. At the time of his death in 1890 it had a membership of 25,000 and its annual receipts were $500,000.

Mudir, moo-dēr', the title of a Turkish official; one who is at the head of a canton. In Egypt, the governor of a province.

Muezzin, mū-ĕz'ĭn, in Mohammedan countries the beadle of the mosque, whose duty it is to summon the faithful to prayer at the assigned periods by public proclamation from the minaret (q.v.).

Muf'ti, the title of a high Turkish official: The Grand Mufti or Sheikh-ul-Islam is one of the interpreters of the Koran, by whose decisions the cadis have to judge.

Mugger. See MARSH-CROCODILE.

Muggleto'nians, a religious sect founded (1610) by Lodowick Muggleton in London. He claimed that he and his friend John Reave, a tailor like himself, were the two witnesses who should «prophesy a thousand two hundred and three score days, clothed in sackcloth» (Rev. xi. 3). He was 40 years old when he received this commission through visions and mysterious voices. 'The Divine Looking Glass' (1656) contains an exposition of the teachings of the Muggletonians who deny the doctrine of the Trinity and believe in a material God, who suffered on the cross. This Muggletonian bible was republished 1846.

Mugwort, an ornamental and culinary herb. See ARTEMISIA.

Mug'wump, in American politics, a term originating during the presidential campaign of 1884 between Grover Cleveland and James G. Blaine. It was applied by a New York newspaper to such members of the Republican party as refused to support their party nominee, James G. Blaine, and advocated the election of Grover Cleveland in the interest, they claimed, of civil service reform. The word belongs to the Algonquin dialect of the Indian languages and is used by John Eliot in his translation of the Bible to translate the Hebrew word *alluph*, a «leader.» Eliot used it in the sense of «big chief,» a term more comprehensible to the Indian mind than that which appears in the King James' version —«duke.» The word was spelled «Mugquomp» in the singular, and «Mugquompaog» in the plural. It appears in many places throughout the Algonquin translation of the Old Testament.

Muharram, moo-hăr'ạm, the first month in the Mohammedan year.

Mühlbach, mül'bäh, **Luise.** See MUNDT, KLARA.

Muhleman, mūl'man, **Maurice Louis,** American author: b. near Alton, Ill., 27 Nov. 1852. He was graduated from the law school of Columbia University in 1879 and was appointed to the United States treasury service in 1872. In 1888–1901 he was deputy assistant treasurer of the United States. He has published: 'The Money of the United States' (1894); 'Monetary Systems of the World' (1896); etc.

Muhlenberg, mū'lĕn-berg, **Frederick Augustus Conrad,** American Lutheran clergyman and politician: b. Trappe, Pa., 1 Jan. 1750; d. Lancaster, Pa., 4 June 1801. He was educated in Halle, Germany, and returning in 1770 was ordained to the Lutheran ministry. In 1773–6 he had charge of a Lutheran church in New York and then removed to Pennsylvania where he held several pastoral charges. He was a hearty sympathizer with the cause of the colonies and though not participating in the war aided his countrymen politically and ultimately abandoned his pastoral work for a political life. He served in the Continental Congress and was speaker of the first House of Representatives under Washington, and in 1795 his was the deciding vote which rescued the Jay treaty from defeat.

Muhlenberg, Gotthilf Henry Ernst, American Lutheran clergyman and botanist: b. Trappe, Pa., 17 Nov. 1753; d. Lancaster, Pa., 23 May 1815. He was a brother of F. A. C. Muhlenberg (q.v.), and was educated with him in Halle, Germany. He returned to America in 1770, was ordained to the ministry and became an assistant to his father who was in charge of a Lutheran church in Philadelphia. He served in various charges until 1780 when he accepted a call to Lancaster where he remained until his death. In addition to his pastoral duties he distinguished himself as a scientist and took first rank as a botanist. He published: 'Catalogus Plantarum Americæ Septentrionalis' (1813); 'Descriptio Uberior Graminium' (1817); etc.

Muhlenberg, mū'lĕn-bĕrg, **Heinrich Melchior,** German-American clergyman, organizer of the Evangelical Lutheran Church in America: b. Eimbeck, Hanover, 6 Sept. 1711; d. New Providence (now Trappe), Montgomery County, Pa., 7 Oct. 1787. He was educated at the University of Göttingen (1735–7), studied theology there (1737–8) and at Halle (1738–9), was ordained in 1739, and from 1739 to 1741 was deacon of the church at Grosshennersdorf, Upper Lusatia. On 6 Sept. 1741 he was called as missionary to the Lutheran congregations of Pennsylvania, located at Philadelphia, New Providence (now Trappe), and New Hanover. At that time there was a large number of Lutherans in America; but they were unorganized and without pastors, and such religious meetings as they had were conducted by laymen. Muhlenberg, who arrived at Charleston, S. C., 22 Sept. 1742 and at Philadelphia 25 November, was well qualified for the work of effecting union and order. He at once entered on the duties of his charge, and preached his first sermon in Pennsylvania in an unfinished log-building at New Hanover 28 November. Though Muhlenberg's local pastorship was largely restricted to the three congregations which had summoned him, his activities were really those of a bishop. He traveled over a wide extent of territory, preached at Lancaster, York, and other places in Pennsylvania, in New York, and also occasionally in New Jersey, Maryland, and among the Salzburger Lutherans of Georgia. «There was probably,» thinks Stoever, «not a Lutheran church, in his day, in this country in which he had not officiated.» He was at first looked upon as an intruder by Zinzendorf and other Moravians, with whom he was for a time involved in conflict. But so successful was he in his labors that by 1745 there was real need for the reinforcement from Halle, consisting of the Rev. Peter Brunnholtz and the catechists Kurtz and Schaum. The first church edifice at Philadelphia, St. Michael's, was completed in 1743, and on 25 June 1769 Zion's Church, then considered the largest and finest in the United States, was dedicated there. On 14 Aug. 1748 the first Lutheran synod in America was organized under the direction of Muhlenberg, who became its president. In 1754 Muhlenberg prepared the 'Kirchen Agende,' a directory for public worship, and in 1762 reorganized the Philadelphia congregation under a constitution which became the basis of that of most congregations later established. He identified himself with the American cause in the Revolution, and was in consequence subjected to many annoyances, particularly when Pennsylvania was the scene of war (1777–8). He was a linguist of high rank, versed in Hebrew, Greek, and Latin (in which he made an address at the synod of 1750), and proficient in English, Dutch, French, Bohemian, and Swedish. His large foreign correspondence appeared at Halle in 1787. Consult: 'Die erlaubte Klage über den Abschied treuer Knechte Gottes' (1788), a memorial sermon by J. H. C. Helmuth (with biographical sketch); Stoever, 'Memoir of the Life and Times of Muhlenberg' (1856); Mann, 'Life and Times' (1887), considered the best.

Muhlenberg, mū'lĕn-bĕrg, **John Peter Gabriel,** American patriot: b. Trappe (then New Providence), Montgomery County, Pa., 1 Oct. 1746; d. near Philadelphia 1 Oct. 1807. He was the son of H. M. Muhlenberg (q.v.), the founder of the German Lutheran Church in America. He was educated for the ministry, was for a time pastor of German Lutheran churches at New Germantown, N. J., and Bedminster, N. J. In 1772 he went to Woodstock, Va., and finding that in order to enforce the payment of tithes he must be ordained in the Episcopal Church, he was ordained priest in England. He was chairman of the Shenandoah County committee of safety, and 1774 a member of the Virginia house of burgesses. At Washington's request he became a colonel in the Continental army. His last sermon was upon the duties men owe their country; and saying, «There is a time for all things — a time to preach and a time to fight — and now is the time to fight,» he stripped off his gown after the service, appeared in full uniform, called for recruits and enrolled about 300 of the parishioners. He participated in several battles, was made brigadier-general in 1777, and major-general at the close of the Revolution. After the war he removed to Pennsylvania, where he was elected a member of the supreme executive council, and in 1785 became its vice-president. He served as representative in Congress from 1789 to 1795, and from 1799 to 1801. In 1801 he was elected United States senator, but soon resigned and was appointed supervisor of the revenue for the district of Pennsylvania. From 1803 till his death he held the office of collector of the port of Philadelphia. Consult Muhlenberg (H. A.), 'Life' (1849).

Muhlenberg College, in Allentown, Pa.; founded in 1867 under the auspices of the Lutheran Church. In 1910 there were connected with the college 19 professors and instructors, and nearly 294 pupils. There were in the library 12,000 volumes; the grounds, buildings, and furnishings were valued at $105,000; the productive funds were $271,000; and the annual income, including fees, tuitions, and from productive funds, over $47,000. The courses of study lead to the degrees of A.B. and B.S.

Mühlhausen, mül'how-zĕn, Germany, a town of Alsace-Lorraine. See Mülhausen.

Mühlhausen, Prussia, a town of Saxony, in a fertile district on the Unstrut, 29 miles northwest of Erfurt. It has two interesting old churches, an old town-house, a gymnasium, various technical, commercial, and other schools, hospitals, an orphanage, etc. It manufactures woolen and cotton or mixed goods, hosiery, cigars, leather, cycles, sewing-machines, wooden wares, furniture;. and carries on tanning, dyeing, malting, brewing, etc. The Anabaptist Münzer, a leader in the Peasants' war, had his headquarters here, and was executed near by in 1525.

Mühlheim, mül'hīm. See Mülheim.

Muir, mūr, **John,** Scottish Sanskrit scholar: b. Glasgow 5 Feb. 1810; d. Edinburgh 7 March 1882. He was educated at Glasgow University and at Haileybury College, whence he passed into the Bengal Civil Service in 1828. He remained in India 25 years, filling various offices in the revenue and judicial departments. His fame will rest on his 'Original Sanskrit Texts on the Origin and History of the People of India, their Religion and Institutions,' illustrated (1858–70). The first volume discusses the legendary accounts of the origin of caste; the second, the primitive homes of the Hindu; the third, the opinions of Hindu writers on the Vedas; the fourth, the contrast between Vedic and later Hindu theology; and the last the cosmological and mythological conceptions of the Indians in the Vedic age. In 1862 he founded a chair of Sanskrit and comparative philology in the University of Edinburgh.

Muir, John, American naturalist and explorer: b. Dunbar, Scotland, 21 April 1838. He came to America in 1849 with his father, who settled near Fox River, Wis.; entered the University of Wisconsin when 22; and after a special course of four years commenced his lonely journeys through Canada, Eastern and

Western United States, the West, and the South, that made him a botanist and a geologist. In 1868 after visiting the Yosemite Valley, he made it his main central camp for ten years while studying the forests, glaciers, etc., of the Sierra Nevada. He discovered in the High Sierra 65 residual glaciers. He made his first trip to Alaska in 1879, discovered Glacier Bay, and Muir Glacier, and explored some of the upper courses of the Yukon and Mackenzie rivers; in 1880 accompanied the DeLong search expedition to the Arctic, and in 1903–4 traveled in the Caucasus, Siberia, Manchuria, Japan, India, Egypt, Australia, and New Zealand. He has written much for newspapers and periodicals, urging the formation of national parks—both the Sequoia and Yosemite are in great part due to his efforts—and has published 'The Mountains of California' (1894), and 'Our National Parks' (1901).

Muir, SIR **William,** Scottish Arabic scholar: b. Glasgow 1819; d. 11 July 1905. He attended lectures at the universities of Edinburgh and Glasgow and at 18 entered the Bengal civil service, where he attained distinction. He was lieutenant-governor of the Northwest Provinces 1868–74, and financial minister to the government of India 1874–6. Returning to England he sat on the Council of India, 1876–85, was elected principal of the University of Edinburgh, 1885–1900. He has published: 'Life of Mahomet' (1858–61; abridged ed. 1877); 'Annals of the Early Caliphate' (1883); 'The Koran, Its Composition and Teachings, and the Testimony it Bears to the Holy Scriptures' (1877); 'Extracts from the Koran' (1880); 'The Early Caliphate and Rise of Islam' (1881); 'The Mohammedan Controversy' (1897).

Mukden, mook'dĕn, **Moukden,** or **Fung-tien-fu,** capital of Manchuria, and of the province of Shinking, situated on the Hun, a tributary of the Liau River, about 500 miles northeast of Peking. Its port is Newchwang, about 120 miles distant, near the Gulf of Liao-Tong. It is the cradle of the Manchu race, and until recently was known by its old Chinese name of Sin-Yang, its Manchu name of Mukden — or «Flourishing Capital» — given to it by its conquerer nearly 200 years ago, being used only in official documents. It is a station on the Russo-Chinese railroad, and is surrounded by walls laid out in regular parallelograms between one and two miles each way, and built of squared stone or brick, thick and massive at the base and tapering gradually to the top. These walls are 40 feet in height, 21 feet in width, and are protected at the top by an 8-foot crenelated parapet. Outside these walls there is a wide moat, and then come the suburbs, which extend for a mile or more on all sides. These again are enclosed by walls, which, however, are constructed of mud and are of little value. In the heart of the town is an inner wall, three miles in circuit, enclosing the emperor's residence, the government offices, courts, and other buildings connected with them, which are arranged on a plan similar to those of Peking. In 1631 the Manchu monarchs made Mukden the seat of government, and succeeding emperors have done much to enlarge and beautify it. At Mukden are the tombs of the Manchu emperors, and the royal burying ground is ornamented with stone images of elephants as ponderous as some of the carved shapes that mark the graves of Egyptian kings. Other interesting relics of the past in the environs of the city are the Temple of Heaven and the Temple of Earth, both of which were built by Tai Tsung, and the remains of which are still to be seen.

Like all the cities of Manchuria, Mukden is laid out on a regular plan not unlike American towns. The main street runs due north and south, and the second best crosses it at right angles, while parallel to these run a series of alleys teeming with an industrious population. The city suffered greatly during the uprising of the Boxers in 1900, and was used by the Russian army under Kuropatkin as a base of supplies during the Russo-Japanese war, but has just been captured (March 1905) by the Japanese army in one of the greatest and most remarkable battles of modern history. Pop. about 250,000. See MANCHURIA.

Mukhtar Pasha, mookh-tär' **păsh'ȧ** (GHAZEE AHMED), Turkish general: b. Brusa, Turkey, 1837. He was educated in the military schools in Brusa and in Constantinople and entered upon a military career. In the campaign of 1860 in Montenegro he played a conspicuous part and thereafter received steady and rapid promotion. He became a full general in 1870 and in 1873 was appointed minister of public works. In the wars of Bosnia, Herzegovina and Montenegro in which he commanded he displayed great generalship, gaining 20 victories and never suffering defeat. The campaign of Kars-Erzerum in 1877 went against him and he was defeated by the Russian general Melikoff after a brilliant engagement for which he received the highest Turkish military title, «Ghazee.» In 1878 he was made grand master of the Turkish artillery, in which capacity he subdued the Cretan insurrection in that year, and in 1885 was designated to the post of Turkish High Commissioner in Egypt.

Mul'berry, a genus (*Morus*) of trees of the order *Moraceæ* (q.v.), of which 100 species have been described, but only five are now recognized. The mulberries are characterized by the possession of leaves variable in form even upon the same twigs; monœcious flowers in axillary catkins; and multiple blackberry-like fruits formed by the coherence of the pistillate flowers which become fleshy as they swell. They are natives of the mild parts of Asia and Europe, whence they have been taken by man to similar regions throughout the world. In the Old World various species are of economic importance, principally because their foliage supplies the food of the silkworm, and their fruit a dessert and a wine. The wood of most species is of inferior quality, but that of one species, the red mulberry (*M. rubra*), is fine-grained, strong, and useful for ship-building. The trees are readily propagated by means of seeds, layers, cuttings, or by graftage. They thrive upon almost any soil; even on rocky hillsides and gravelly lands, but succeed best upon arable soil in which they may be planted from 20 to 40 feet apart, and cultivated like other orchard fruits until they have full possession of the ground. The fruits, which are borne in great profusion, are too soft for market purposes, and usually too sweet for preserving alone. They are generally shaken from the trees upon sheets. Pigs are very fond of them.

The following are the most important species. The white mulberry (*M. alba*) is the silkworm mulberry, and has produced most of the named American varieties valued for their fruit, but not those esteemed in Europe. The black mulberry (*M. nigra*) is the European «dessert» species, and is little used for the feeding of silkworms. The red mulberry (*M. rubra*) is a native American tree to be found from Massachusetts to Nebraska and southward to the Gulf States. It has produced several good dessert varieties, the fruits of which are characterized by greater acidity than those of the Old World sorts. It seems to be ill adapted to the feeding of silkworms. The so-called Russian mulberry is a variety of the white. It produces inferior fruits but is valued in the Plains States for wind-breaks, for which purpose its ability to resist extremes of drouth, cold and neglect, specially fit it. All the above species have produced horticultural varieties, some variegated, others weeping, which are planted more for ornamental purposes than for fruit.

Another important species is the Indian (*M. indica*) which is used in silk culture and for its fruit, which is of fine flavor. It is cultivated in India, China and other countries of the East.

The paper-mulberry (*Broussonetia papyrifera*) is a native of Eastern Asia. This tree is of a moderate size, bearing leaves which are either simple or divided into lobes, more or less deep, rough above and hairy beneath. It was originally from India and Japan, but is now very commonly cultivated in Europe, and succeeds even in the more northern parts. The islanders of the Pacific make a kind of clothing from the bark of this tree in the following manner: Twigs of about an inch in diameter are cut and deprived of their bark, which is divided into strips, and left to macerate for some time in running water. After the epidermis has been scraped off, and while yet moist, the strips are laid out upon a plank in such a manner that they touch at the edges, and two or three layers of the same are then placed upon them, taking care to preserve an equal thickness throughout. At the end of 24 hours the whole mass is adherent, when it is removed to a large, flat, and perfectly smooth table, and is beaten with little wooden clubs till it has attained the requisite thinness. This kind of cloth is easily torn, and requires to be washed and beaten many times before it acquires its full suppleness and whiteness. The natives dye it red and yellow, and also make a similar cloth from the bread-fruit tree, an allied plant; but that from the mulberry is preferred. The paper which is used in Japan and many other countries in the East Indies is made from this plant. For this purpose the annual shoots are cut after the fall of the leaves, tied in bundles, and boiled in water mixed with ashes; after which the bark is stripped off by longitudinal incisions, and deprived of the brown epidermis. The bark of the more tender shoots is separated from the rest, as it furnishes a white paper for writing, while that produced by the remainder is coarse and gray, and serves for wrapping, or similar purposes.

Mulch, any material kept in a loose condition at the surface of the soil for the purpose of checking evaporation, conserving moisture, protecting plant-roots or low-growing plants from frost or heat, preventing puddling and washing of the soil, retarding growth in spring, keeping the surface soil open, supplying plant-food, etc. The materials most frequently applied are straw, marsh-hay, leaves, litter, and brush; but the most widely important mulch is the surface soil itself, kept powdery by frequent tillage, given especially after rains when it is desirable to break the crust formed upon the surface. Since mulches keep the soil beneath them moist by breaking the capillarity, they are of particular advantage in dry climates; but since the vegetable mulches, such as straw and leaves, cannot be used in summer where the land must be cultivated and since they supply hiding places for insects, they can rarely be used advantageously in fruit plantations, in which they are often also a positive detriment because they encourage the growth of roots near the surface. In climates liable to extremes of temperature this position of the feeding roots is often disastrous to the crop if not to the plants themselves. Except, therefore, for winter protection, when such seems to be necessary, the soil itself is generally best. But the depth of the powdery layer will depend largely upon the climate, character of the soil, and kind of crop; in arid regions, with light soils, and with deep-rooted plants, the soil-mulches are usually deeper than with the reverse conditions.

Mulder, mool'dĕr, **Gerardus Johannes,** Dutch chemist and physician: b. Utrecht, Holland, 27 Dec. 1802; d. there April 1880. He was educated at the University of Utrecht and became professor of botany and chemistry there (1840–68), but first practised medicine in Amsterdam for some years. He was also for a short time professor of chemistry at Rotterdam. He became known chiefly through his researches on the proteids, and advanced the belief in a hypothetical substance which he called protein. This he believed to be the essential nitrogenous constituent of food, existing in animals, and derived ready-formed from plants and vegetables. The publication of this theory involved Mulder in a controversy with Liebig, who from the first doubted the existence of protein as an independent chemical compound. The whole theory has been abandoned, and the word protein is now used to indicate the first element in compounds. His principal work 'Chemistry of Vegetable and Animal Physiology' has been translated into English by Fromberg, and his 'Chemistry of Wine,' by Bence Jones. He also wrote: 'Chemical Researches'; 'De Voeding in Nederland'; 'De Voeding van den Neger in Suriname.' and his posthumous autobiography 'Levensschets' (1881; 2d ed. 1883).

Mule, in zoology, a term loosely used as synonymous with hybrid, more usually applied to the produce of a male ass with a mare, the mule proper, and to the hinny, the offspring of a stallion and a she-ass. The mule does not attain maturity as soon as the horse, but is useful a much longer period. As a beast of burden it is in some respects preferable to the horse; it is easily fed, is equally good for carrying and drawing, its less sensitive skin enables it to support exposure to the weather; like the ass, it enjoys comparative immunity from disease, and it is as surefooted as a goat. Mules have been known from the earliest ages; there are frequent references to them in Scripture and in Greek and Latin literature. Kentucky, Missouri, and Kansas take the lead in mule-raising in the United States, and the small Mexican mule is a very useful animal. France is the most important mule-raising country in Europe; then come Italy, Spain, and Portugal, where they are used for pack and draft. They are largely employed as draft animals in warfare. Fecundation of the hybrid-female by the male ass or the stallion is not very rare, though she rarely throws a living foal. Consult: Fegetmeier, 'Horses, Asses and Zebras' (London, 1895), and publications of the U. S. Department of Agriculture. (See HYBRIDITY.) For statistics of mules in the United States, etc., see LIVESTOCK, AMERICAN.

Mule Deer, or **Blacktail,** a deer of the western United States (*Cervus macrotis;* or *Odocoileus hemionus*), remarkable for its disproportionately large ears. Its common name «blacktail» among the hunters is due to the black color of the terminal part of the tail, distinguishing it from the «whitetail» or eastern deer (q.v.); but is better reserved for the Pacific coast species (see BLACKTAIL). This deer is rather larger than the eastern one, and is a deer of the rocky plains, and especially of the mountains, which it climbs in summer as high as it can go, pasturing upon alpine slopes, and resting upon the summits of cliffs and ledges where it has a wide outlook. Its gait is very distinctive, also, consisting of a series of jerking bounds very effective on declivities, but looking strange on a level plain. The character of the sport afforded by this deer depends much upon the kind of country in which it is hunted, the method of pursuit being very different in the chaparral of southern California from that followed among the broken plains of Montana. When hiding in summer it will often wait until almost touched before starting off. In winter it gathers into herds and wanders among sheltering hills and vales. It is therefore the characteristic deer of the Rocky Mountain region, and was formerly exceedingly numerous, and one of the principal sources of food and clothing for the Indians. Originally the species occurred commonly as far east as the plains and prairies extended; but was early exterminated in the central Mississippi Valley; and from about 1875 to 1895 was the object of persistent slaughter by hide hunters. At the beginning of the present century, therefore, it had nearly disappeared from the plains south of the upper Missouri, was scarce in the central Rockies, and numerous only in the less frequented parts of the northwestern States and adjoining provinces of Canada. Its hide makes the best of tanned deer-leather (buckskin), and its flesh is excellent. The mule deer is not much taller than the Virginian deer, standing about 3 feet 4 inches high at the shoulder, but is heavier and of coarser build. The ears are very large and thickly haired, the tail roundish, and white with black tip. The coat is dull yellowish in summer, palest in the southern desert varieties, but becomes bluish gray with the autumnal molt; face between the eyes dusky, elsewhere white; throat, abdomen and inside of the legs white; antlers forking equally, and each prong again bifurcating.

Consult: Caton, 'Antelope and Deer of America' (1877); Lydekker, 'Deer of all Lands' (1898); Baillie-Grohman, 'Fifteen Years' Sport and Life in the Hunting Grounds of Western America' (1900); Roosevelt (and others), 'The Deer Family' (1902).

Mule-killer. See MANTIS.

Mule Machine, a spinning machine in which the rovings are delivered from a series of sets of drawing rollers to spindles placed on a carriage, which travels away from the rollers while the thread is being twisted, and returns toward the rollers while the thread is being wound. It was invented by Samuel Crompton, of Bolton, England, and perfected in 1779. The combination which gave rise to the term mule was the junction of the drawing rollers of Arkwright with the spinning jenny of Hargreaves. The object of the machine is to deliver the roving with the required degree of attenuation and twist it as delivered. For this purpose, the spindles, instead of being stationary, are placed on a movable carriage, which is wheeled out to twist the threads and wheeled in again to wind on the spindles.

Mul'ford, Elisha, American Episcopal clergyman and philosophical writer: b. Montrose, Pa., 10 Nov. 1833; d. Cambridge, Mass., 9 Dec. 1885. He was graduated from Yale in 1855 and subsequently studied theology, law and philosophy. He entered the Episcopal ministry and held several rectorates, but from 1881 lived in Cambridge, Mass. He wrote 'The Nation' (1870), a much valued treatise on the philosophy of the State, and 'The Republic of God' (1881), relating to the philosophy of religion.

Mulford, Prentice, American journalist and author: b. Sag Harbor, N. Y., 5 April 1834; d. Sheepshead Bay, N. Y., 27 May 1891. He went to sea at 17; settled in California during the gold rush; there became a newspaper writer; in 1872 went to England to advertise California; and on his return to New York became editor of the department called «The History of a Day» in 'The Graphic,' holding this post for six years. In 1886 he started his famous «White Cross Library,» a series by which he preached his own peculiar philosophy of life, which held that «thought-power» is indomitable. Besides this occult system, which was introduced to the public under such book titles as 'Force and How to Get It'; 'The God in Yourself'; and 'The Doctor Within'; Mulford wrote 'The Swamp Angel' (1888), a humorous story giving his solitary experiences in a New Jersey wild to which he retired in 1883; also 'Life by Land and Sea' (1889). He was found dead in his boat on Sheepshead Bay.

Mul'hall, Michael George, Irish statistician: b. Dublin, Ireland, 1836; d. Killiney, Ireland, 12 Dec. 1900. He was educated in the Irish College at Rome, and in 1861 went to Buenos Ayres, where he founded the *Standard,* the first English daily paper in South America. He gained a wide reputation as a statistician, and in 1880 made a calculation of the census of the United States for 1900 which came within 95,000 of the number given by the census report in that year. He was a frequent contributor to the 'Contemporary Review,' and published: 'Rio Grande do Sul and Its German Colonies'

(1873); 'A Dictionary of Statistics' (1883); 'Fifty Years of National Progress, 1837–87' (1887); 'Industries and Wealth of Nations' (1896); etc.

Mülhausen, mül'how-zĕn, or **Mühlhausen,** (French, Mulhouse), Germany, a town of Alsace-Lorraine, on the Ill River and the Rhône Canal, 66 miles by rail southwest of Strasburg, and 18 miles northwest of Basel, Switzerland. It is an important commercial and manufacturing centre, the principal seat of cotton spinning in western Germany, and carries on calico printing, dyeing, the spinning of woolen and worsted yarn, the manufacture of machinery, railway material, and numerous other industries. Its industrial importance dates from 1746, when a cotton-factory was established. It is noted for its model dwellings for the working classes in the «cité ouvrière,» workingmen's colony, on the northwest, founded by Mayor Dollfus in 1853. A migration to the suburbs, however, is taking place, leaving the artisan colony in the occupation of small tradesmen. Mülhausen is first mentioned in 717; it became an imperial free city in 1273, and in the 15th century entered into an alliance with the Swiss, which lasted till 1798, when it became French. It was included in the cession of Alsace to Germany in 1871.

Mülheim, mül'hīm, or **Mühlheim,** Prussia, two towns of the Rhine province: (1) Mülheim-on-the-Rhine, with a bridge spanning the river, is almost opposite Cologne. The town has manufactures of machinery, cables, wire ropes, wagons, velvet, silk, chemicals, etc. Pop. about 46,000. (2) Mülheim-on-the-Ruhr, 14 miles north of Düsseldorf, has coal and iron mines, iron foundries, manufactures of ironware, machinery, glass, woolen and cotton goods, and a considerable trade in sandstone, building materials, and coal. The Ruhr is crossed here by a chain bridge and a railway bridge.

Mulita, a small armadillo, resembling a mule, native to Southern South Africa.

Mull, Scotland, an island of Argyllshire, the largest of the Inner Hebrides next to Skye. Its length is 35 miles; greatest breadth, 30; superficial area, 301 square miles. It is irregular in shape, and the large bay on the west side contains a number of islands, including Ulva and Staffa. Iona lies off its southwest extremity. The island is rugged and mountainous; Benmore, the highest mountain, is over 3,000 feet above the level of the sea. The principal village is Tobermory, pop. about 1,000. Between the island and the mainland, on the northeast, is the Sound of Mull.

Mullany, mŭl-lā'nĭ, **James Robert Madison,** American naval officer: b. New York 26 Oct. 1818; d. Bryn Mawr, Pa., 17 Sept. 1887. He was appointed to the navy as midshipman in 1832 and received steady promotion, becoming lieutenant in 1844. He served with distinction in the Mexican War, and at the outbreak of the Civil War in 1861 was promoted commander. He commanded the Oneida in the battle of Mobile Bay and performed valiant service with her on that occasion. He was commissioned rear-admiral in 1874, and until 1876 was in command of the North Atlantic squadron, and in conjunction with Gen. Emory and Gen. Sheridan at New Orleans protected American interests on the Isthmus of Panama. From 1876 until 1879, when he was retired from active service, he was governor of the naval station at Philadelphia.

Mullany, Patrick Francis. See Azarias, Brother.

Mullein, a genus of biennial and perennial herbs (*Verbascum*) of the natural order *Scrophulariaceæ*. The species, of which more than 100 have been described and more than 30 are cultivated, have tap roots, woolly foliage in rosettes during the first year, and terminal spikes or racemes of small, usually yellow, flowers which appear from midsummer until late autumn. Some species were formerly reputed medicinal. In America they are usually considered as weeds, but in Europe they are valued as ornamental plants, particularly for mixing with shrubbery and planting in the rear of flower borders. Though natives of the Mediterranean region, some species are known in England as American flannel or velvet plant. The best known species in the United States are probably the moth mullein (*V. blattaria*), the common mullein (*V. thapsus*), the white mullein (*V. lychnitis*), and *V. phlomoides*, which are all common in pastures and uncultivated fields.

Müller, Charles Louis, shärl loo-ē mü-lăr, French painter: b. Paris 22 Dec. 1815; d. there 10 Jan. 1892. He was the pupil of L. Cogniet, Baron Gros, and others in the Ecole des Beaux-Arts, and in 1850 was made director of the manufactory of Gobelin tapestries. His fertility in the production of historic pictures and portraits was amazing. Among them are: 'Heliogabalus' (1841); 'Primavera' (1846); 'May-day'; 'Lady Macbeth'; and his masterpiece, 'The Last Victims to the Reign of Terror'; the last two being in the Luxembourg; 'Vive l'Empereur' (1855); 'Marie Antoinette' (1857); 'A Mass During the Reign of Terror' (1863); 'The Madness of King Lear' (1875); 'Mater Dolorosa' (1877). He executed the frescoes of the Salle d'Etat in the Louvre, and as a painter is more to be commended for clever drawing and composition than for his somewhat flat and mediocre coloring.

Müller, Friedrich, frēd rĭн mül'lĕr, called «Maler Müller,» or «Müller the Painter,» German artist and poet: b. Kreuznach 13 Jan. 1749; d. Rome 23 April 1825. Some of his etchings, animals, compositions in the Flemish style, pastoral scenes, etc., were remarkable for their originality and freedom. He deserves more credit as a poet, for at a time when German poetry had degenerated, Müller helped to give a new impulse to German literature. His best works, 'Niobe,' 'Faust,' and 'Genevieve,' are characterized by richness, warmth, and elevated delineation of character, though sometimes wild and disconnected.

Müller, Friedrich Max, English philologist: b. Dessau, Germany, 6 Dec. 1823; d. Oxford 28 Oct. 1900. His father was Wilhelm Müller (q.v.), a famous German lyrist, and his maternal great-grandfather Basedow, the educational reformer. His bringing up was in his mother's hands, as his father died when the boy was 4. He studied in Leipsic at the Nicolaischule; had some thoughts of becoming a musician, but entered the University of Leipsic in 1841, and there, under the leadership of Hermann Brockhaus, devoted himself to Sanskrit, publishing a German version of the 'Hitopadésa' in 1844; worked under Bopp in philology and Schelling in philosophy at Berlin for a year; in 1845 went to Paris, where Burnouf suggested to him an edition of the 'Rig Veda'; and in 1846 went to England and interested the East India, Company in this work, which he undertook at the expense of the Company. He was in Paris in 1848, and brought to Palmerston, in London, the first news of Louis Philippe's flight from Paris. In the same year he settled in Oxford, where the 'Rig Veda' appeared, with Sayana's commentary, 1849–74. He became deputy Taylorian professor in 1850, and fellow of All Souls' in 1858; but in 1860 was defeated in his candidacy for the chair of Sanskrit by Monier Williams, after a fierce fight on the part of his opponents, who objected partly to his foreign birth and partly to his very free and unorthodox religious views. The result for linguistic science was unfortunate, as it turned Max Müller from the narrow field of Sanskrit, in which he easily outranked his contemporaries, to comparative philology and the science of religion, in which his achievements were less exact and scholarly, to say the least. In 1868 he became professor of comparative philology at Oxford. He was made a privy councillor in 1896. His greatest single work was as editor of the 'Sacred Books of the East,' a series of English versions of Oriental scriptures, to which he contributed three volumes, and which was begun in 1879 and is not yet complete. He is possibly even better known as a popularizer of the first principles of linguistic science, so that he became in the lay mind the main exponent of this science, whereas his grasp of its detail was inadequate, and many of the etymologies he advanced showed that he was not conversant with the strict rules of phonetics. But the charm of his style, his general grasp of so large a subject, and his admitted pre-eminence in Sanskrit, make interesting and valuable, if not absolutely authoritative, reading of 'The Science of Language' (1861–3); 'Essays on Language and Literature,' and 'Biographies of Words' (1888), all of which have passed through new editions. Max Müller's works on mythology and religion also have a higher repute among general readers than with the specialist, but it cannot be denied that they did much good in stimulating research, as the 'Sacred Books' did in supplying a field for such research. In this class of writings mention should be made of: the 'Essay on Comparative Mythology' (1856); 'Introduction to the Science of Religion' (1873); 'The Origin and Growth of Religion' (1878); 'Natural Religion' (1889); 'Physical Religion' (1891); 'Anthropological Religion' (1892); 'Theosophy, or Psychological Religion' (1893); the 'Essays on Mythology and Folklore' in the 4th volume of 'Chips from a German Workshop'; and 'Contributions to the Science of Mythology' (1897). His versions from the Sanskrit and the Pâli have been alluded to; 'A History of Ancient Sanskrit Literature' (1859), and a 'Sanskrit Grammar' also should be mentioned, and it should be borne in mind that it is in this field that the scholar spoke with authority. From his youth Max Müller was interested in philosophy; he wrote an excellent version of Kant's 'Critique of Pure Reason' (1881); also 'The Science of Thought' (1887), urging that thought was inconceivable without language, and the Oriental studies, 'Three Lectures on the Vedânta Philosophy' (1894), and 'The Six Systems of Indian Philosophy' (1899). An entirely different side of the man is disclosed by 'My Indian Friends' (1899), which shows much of his broad and charming personality; or by 'Deutsche Liebe' (1857), a romantic and popular story translated into French, Italian, and Russian, and appearing in English in two versions, one American, unauthorized and very successful, and a later one (1873) by Mrs. Max Müller. He also edited his father's poems (1868), and Scherer's 'History of German Literature.' His collected works, including the four volumes of 'Chips from a German Workshop' (1867–75), appeared 1898 *et seq.* Consult his own 'Auld Lang Syne' (1898), and 'My Autobiography' (1901); and his wife's 'Life and Letters of Max Müller' (1902).

Müller, Georg Friedrich, German-English philanthropist: b. Kroppenstädt, Prussia, 27 Sept. 1805; d. Bristol, England, 10 March 1898. Entering the University of Halle as a student of theology in 1825, although he had fallen into irregularities of life, he was converted before the end of that year, and in the following year began to preach and teach. In 1829 he went to London, whither the Society for Promoting Christianity Among the Jews had invited him, settled at Teignmouth as pastor of Ebenezer Chapel, where he gave up pew-rents and substituted box-collections, finally refusing a salary and depending on voluntary gifts. In 1832 he joined Henry Craik, a prominent member of the sect of Plymouth Brethren, in ministerial work at Bristol. In 1835 he published a proposal for the establishment of an orphan home, which took shape in 1836 at Bristol. The experiment was successful, the work grew from year to year, and by 1875 no less than 2,000 children were lodged, fed, and educated without other financial maintenance than that received in donations from all parts of the world. The orphanage was moved in 1849 to Ashley Down, a suburb of Bristol. With his wife Müller made evangelistic tours in Europe, America, and Asia. He published 'A Narrative of Some of the Lord's Dealings with Georg Müller' (1837).

Müller, Johann Friedrich Theodor, yō hän frēd'rĭH tā'ō-dōr (better known as Fritz Müller, and also known as Müller-Desterro), German naturalist: b. near Erfurt 31 March 1821; d. 1897. After studying at the Universities of Greifswald and Berlin, he went to South America in 1848, and settled on the island of Santa Catharina, Brazil, living there the ordinary pioneer's life until appointed (1856) to teach natural history and mathematics in the Desterro gymnasium. From 1874 he was engaged for a time as collector for the museum at Rio de Janeiro. His published papers on crustaceans, insects, worms, jellyfishes, etc., were many, most of them appearing in the 'Annals' of the Rio de Janeiro Museum, Wiegmann's 'Archiv für Naturgeschichte,' and similar publications. In his 'Facts for Darwin' (1864), a book written under the stimulus of Darwin's 'Origin of Species,' he made valuable applications of Darwinianism in new fields, and won reputation among men of science for the originality and fertility of his observations and deductions.

Müller, Johann Gotthard von, German engraver: b. Bernhausen, near Stuttgart, 4 May 1747; d. Stuttgart 14 March 1830. After studying under Guibal, the painter, he turned to engraving, and in 1770 went to Paris, where, under Wille, he studied for six years, and after winning several prizes was elected to membership in the French Academy. Returning in 1776 to Stuttgart, he taught there for nine years. While there he was called to Paris to engrave a portrait of Louis XVI. This is regarded as his most important work, next to which may be ranked his 'Battle of Bunker Hill,' after Trumbull; 'Madonna della Seggiola,' after Raphael; etc. He was knighted in 1818.

Müller, Johannes von, German-Swiss historian: b. Schaffhausen 3 Jan. 1752; d. Cassel 29 May 1809. He studied at Göttingen, and in 1772 became professor of Greek at Schaffhausen. He lived and taught in Geneva 1774–80, where he began his 'Allgemeine Geschichte' (3 vols. 1810), and published the first volume of his 'Geschichte der Schweitzer.' In 1786 he became librarian and councillor of state to the Elector of Mainz; in 1792, when Mainz was taken by the French, he went to Vienna, where the Emperor Leopold nominated him a member of the privy council. In 1804 he left Vienna for Berlin, where he was appointed historiographer of the Hohenzollern family. In addition to his important Swiss history and the 'Allgemeine Geschichte,' he published 'Ueber die Geschichte Friedrichs I.'; 'Ueber den Untergang der Freiheit der Alten Völker'; 'Versuch über die Zeitrechnungen der Vorwelt.' After the battle of Jena, he was appointed by Napoleon (1807) secretary of state in the new kingdom of Westphalia. His 'Sämmtliche Werke' appeared in 27 volumes (1800–17); (new ed. 40 vols. 1831–5). Consult lives by Heeren (1820); Döring (1835); Monnard, in French (1839); and Thiersch (1881).

Müller, Johannes, German physiologist and morphologist: b. Coblenz 14 July 1801; d. Berlin 28 April 1858. After studying anatomy and zoology at Bonn and Berlin, he became professor of physiology and anatomy at Bonn, and afterward succeeded Rudolphi at Berlin. Here he also edited the 'Archiv für Anatomie, Physiologie und Wissenschaftliche Medicin.' He remained in Berlin until his death.

Müller possessed one of the greatest scientific minds of the 19th century, and his remarkable powers of application, acuteness, and penetration led him into wide fields of research, where he succeeded in making most valuable observations. He is regarded as the founder of modern physiology. He summed up the work of his predecessors, instituted new methods of experimental and microscopic investigation, and carried out and recorded valuable observations in connection with the mechanism of sight, hearing, and voice. He contributed to the foundation of Bell's law and the principles of reflex action and other nervous movements. He further elucidated the chemical and physical properties of chyle, lymph, and bile, and studied in an original and fruitful way the phenomena of the glands and the quality of glandular secretions. To Müller physiology owes the knowledge of chondrin. His 'Handbuch der Physiologie des Menschen' (1833–40; Eng. trans. 1840–9) exercised great influence as a text-book. Müller counted among his pupils such men as Helmholtz, Vierordt, Du Bois-Reymond, etc. He was also a student of comparative anatomy, and was the founder of the new morphology. His 'Vergleichende Anatomie der Myxinoiden' (1834–43) shows his wonderful insight into the subjects of comparative anatomy and morphology. He greatly enriched the subject of comparative embryology, and was the first to explain the real nature of hermaphroditism. He also discovered the pronephric ducts which bear his name.

Among his important publications is his 'Systematische Beschreibung der Plagiostomen' (1841); and in zoology, the 'System der Asteriden' (1842), in collaboration with Troschel, and 'Horæ Ichthyologicæ.' He also published many articles in the 'Transactions of the Berlin Academy of Sciences.'

Consult: Virchow, 'Johannes Müller, Eine Gedächtnisrede' (1858); Bischoff, 'Ueber Johannes Müller und sein Verhältnis zum jetzigen Standpunkt der Physiologie' (1858); 'Proceedings of the Royal Society of London,' Vol. IX., p. 556.

Müller, Julius, German theologian: b. Brieg, Prussia, 10 April 1801; d. Halle, Germany, 27 Sept. 1878. He was educated at Breslau and Göttingen, and abandoned the study of law for theology. He was opposed to the Rationalists, and in 1825–31 was in charge of several small parishes. In 1831 he was preacher at Göttingen University, and in 1835 was elected professor of theology there. From 1835–9 he was professor in Marburg, and for the remainder of his life filled the chair of theology at Halle. His greatest work is 'The Christian Doctrine of Sin' (1829), and among his other books are: 'The Evangelical Union' (1854); 'Dogmatic Treatises' (1870); etc.

Müller, Karl Otfried, German archæologist and philologist: b. Brieg, Silesia, 1797; d. Athens 1 Aug. 1840. He was the son of a field preacher, and his education was begun at the gymnasium of his native town. He was then sent to Breslau, and afterward went to Berlin, where, as a pupil of Böckh, he devoted himself to the study of the life and art of the ancients. After publishing the 'Ægineticorum Liber' (1817) he was appointed instructor in the Magdaleum at Breslau. Here he made an elaborate analysis of Greek mythology, separating allegorical inventions from true history. In 1819 he was made professor of philology, and in 1823 became professor ordinarius at Göttingen. He was a great traveler, and his writings embrace the whole circle of antiquity. His intention was undoubtedly to concentrate the results of his whole life of scholarly activity in his great work, 'Geschichte hellenischer Stämme und Städte.' He only completed two volumes, however: Vol. I., 'Orchomenos und die Minyer' (1820), and Vol. II., 'Die Dorier' (1824). One of his best known works, 'A History of the Literature of Ancient Greece,' a translation by Lewis and Donaldson from the author's manuscript, was published in London in 1840, and the continuator, Donaldson, published another edition in 1858. His 'Kunstarchäologische Werke,' in five volumes (1872–3), is a valuable work. Müller's 'Æschylus's Eumenides' (Göttingen, 1833) was the object of a profound controversy in which Gottfried Hermann and his followers attacked him with great bitterness. Karl Müller was also prominent as an editor. Consult the biography by Ranke (1870).

Müller, Morten. See MORTEN-MULLER.

Müller, Victor, German painter: b. Frankfort 29 March 1829; d. Munich 21 Dec. 1871. Beginning his artistic career at the Frankfort art school, he continued it at Antwerp and ultimately went to Paris (1849), where he stayed for eleven years, diligently studying the methods and manner of Couture, Delacroix and Courbet. He settled in Munich in 1865, and for the castle of Kronberg in the Taunus painted a series of scenes from the history of Baron Hartmuth von Kronberg. He also produced his famous 'Hero and Leander.' Following these works came 'Hamlet with Horatio in the Churchyard'; 'Ophelia'; 'Romeo and Juliet'; and his last and unfinished work 'Faust on a Stroll.' Among his other works are 'Wood Nymph'; 'Tannhäuser in Venusberg'; 'A Scene from Les Misérables.' His last finished picture was a 'Flower Girl.' All of his works are distinguished by a certain literary or poetic character which appeals to the fancy like a strain of lyric music, although the coloring sometimes runs in its vividness to the verge of extravagance.

Müller, Wilhelm, German poet: b. Dessau 7 Oct. 1794; d. there 30 Sept. 1827. He studied at Berlin but the war of 1813 called him from his books, and he was present as a volunteer in the Prussian army at the battles of Lützen, Bautzen, Hanau, and Kulm. In 1814 he returned to his studies at Berlin. His journey to Italy (1819) produced his ingenious work 'Rom, Römer, und Römerinnen' (1820), and on his return to Germany he became teacher of Latin and Greek in the newly established school at Dessau, where he was also appointed ducal librarian. In 1824 appeared his 'Gedichte aus den hinterlassenen Papieren eines reisenden Waldhornisten.' His 'Lieder der Griechen' (1821–4) celebrate the awakening of an oppressed nation, its struggle and its victory. His 'Lyrische Spaziergänge' (Leipsic, 1827) displays the same truth to nature, freshness, and fire, and the same harmony of language which characterizes his other poems. Many of his poems imitate with utmost perfection the true German Volkslied. Several of the 'Müllerlieder' are familiar through Franz Schubert's remarkable musical settings. His 'Bibliothek deutscher Dichter des 17. Jahrhunderts' (1822–7) is a valuable collection of the best lyric poems of that period. His works were collected in five volumes (1830). He was the father of Professor Max Müller, the well-known philologist.

Muller, mŭl'ĕr, **William James,** English painter: b. Bristol 28 June 1812; d. there 8 Sept. 1845. He studied painting under J. B. Pyne, and first exhibited in the Royal Academy in 1833, his picture being entitled 'The Destruction of Old London Bridge — Morning.' In 1833–4 he visited Germany, Switzerland, and Italy, and in 1838 Greece and Egypt; while in 1843 he accompanied the Lycian expedition under Sir Charles Fellowes, bringing back many sketches and pictures of Oriental life and scenery. He lived for some time in London, but returned to Bristol in later life. His pictures, though not numerous, are of exceptional power and merit, among the more notable being the 'Baggage Wagon'; 'Dredging on the Medway'; 'The Slave Market'; and the 'Salmon-weir.' He painted both in water-color and in oils, and was remarkable as a colorist.

Mul'let, the name of several distinct kinds of fishes having external similarities. (1) The red mullets or surmullets are a group of elongate marine fishes of moderate size, renowned for the delicacy of their flesh, and the esteem in which they were held by the ancients. They with the goat fishes (*Upeneus*) and others form a family *Mullidæ*, with five genera and about 40 species, found in all tropical seas, and some species straying northward. Jordan, who classifies them in the suborder *Berycoidei*, remarks: «The family is a very natural one and not closely related to any other.» It resembles the barracudas (*Polymixiidæ*) in having two long unbranched erectile barbels at the throat, which are of service in exploring the muddy bottom along which these fishes creep and search for animal food, mainly small crustaceans. The best known species is that of the Mediterranean (*Mullus barbatus*), which is a small fish, rarely exceeding 6 inches in length, and is carmine red on the upper parts and silvery white on the lower surface. This is the fish held in so high esteem by Roman epicures, and reared in ponds where they were attended and caressed by their owners, and taught to come to be fed at the sound of the voice or bell of the keeper. Specimens were sometimes sold for their weight in silver. Pliny instances a case in which the sum of about £60 sterling was paid for a single fish; and an extraordinary expenditure of time was lavished and wasted upon these slow-learning pets. Juvenal and other satirists descanted upon the height to which the pursuit of this luxury was carried as a type of foolish extravagance. Hortensius, the rival of Cicero, we are told, had a canal of water constructed below the festive table, in which the mullets were allowed to swim, and from which they might be carried to table, and thence to the fire to be cooked and dressed. Apicius invented a mode of drowning or suffocating these fishes in a certain sauce or pickle, which process was said to add highly to their flavor. A similar fashion prevailed of old in England with regard to lampreys, which were drowned in wine previously to being cooked and eaten. This mullet is still esteemed as an article of food, the flesh being white, fat, and nutritious. They are caught mainly in nets, and are hawked about the streets of Italian cities, not under the old Latin name «mugli,» but by one from the Greek, «trigle.» The roes are preserved as condiment called *botargo*, and resembling caviare.

A closely related fish, the striped red mullet or surmullet (*M. cephalus*), is caught abundantly about the British Islands and along the continental coast, and is seen sparingly in the local markets. By some naturalists these mullets are thought to be only the females of the Mediterranean species. A smaller form of the same species is frequently taken on the eastern coast of the United States. Another genus (*Mulloides*) is represented in the Gulf of California by a single species.

(2) The gray mullets are a group of spiny-rayed marine fishes forming a family (*Mugilidæ*) of the suborder *Percesoces*, allied to the silversides and barracudas. They are oblong fishes of moderate size, without a lateral line, very numerous in species common in all warm parts of the world, and often appearing in vast schools, so that they may be captured by wholesale in large nets. Though the flesh is not so good as that of the red mullets it is nutritious, and many species are economically important. These mullets are short-finned, small-mouthed, bottom-feeding fishes, subsisting chiefly upon the little animals and organic matter found in sand and mud; and they have a special straining apparatus in the pharynx for the purpose of preventing objects of too large size from entering the stomach, or foreign substances getting into the gill-chamber; after grinding a mouthful between the pharyngeal bones (for teeth are absent or feeble) the mineral matter is rejected. Another peculiarity of the mullets is to be found in the structure of the œsophagus and stomach, the former being lined with long thread-like papillæ, while the latter has its second portion furnished with muscular walls like the gizzard of a bird, but not divided. The common species is the striped mullet or liza (*Mugil cephalus*) which seems to be almost cosmopolitan, as it is known not only on both Atlantic shores but abundantly from California to Chile. It is 1 to 2 feet long, dark bluish above, sides silvery, with conspicuous dark stripes along each row of scales. A smaller, more thoroughly marine species, dark olive and without streaks is the white mullet or liza blanca (*M. curema*), numerous on both American coasts. Several other species are taken in the Gulf of Mexico and southward, one of which (*M. gyrans*) has the curious habit of swimming round and round at the surface in schools, and is called whirligig mullet.

(3) In the Mississippi Valley, several suckers (q.v.) of the family *Catostomidæ* are called mullets in reference to their mullet-like appearance and behavior.

Consult: Günther, 'Study of Fishes' (1880); Goode, 'Fishery Industries,' sec. 1 (1883); 'American Fishes' (1888); Jordan and Evermann, 'American Food and Game Fishes' (1902).

Mul'ligan Letters, in American political history, a series of letters written by James G. Blaine (q.v.) to a business associate, which it was alleged proved legislative corruption upon the part of Blaine. The letters were obtained by one James Mulligan, a clerk, who appeared as a witness before a Congressional committee appointed to investigate Blaine. On 5 June 1876 Blaine secured these letters and read them before the House, after defying the committee to compel him to surrender them. The letters were freely used as campaign documents in the Presidential contest of 1884, by Blaine's enemies.

Mullinger, mŭl'ĭng-gẽr, **James Bass**, English educator and author: b. Bishop Stortford, England, 1834. He was graduated from St. John's College in 1866 and in 1881–3 was lecturer at Bedford College, London. In 1885–95 he was lecturer on history of education at Cambridge and in 1890–4 lecturer on ecclesiastical history at Trinity College, Cambridge, since when he has been librarian and lecturer in history in St. John's College. He has published: 'Cambridge Characteristics in the 17th Century' (1867); 'The Schools of Charles the Great' (1876); 'The Age of Milton' (1897); 'History of St. John's College' (1901); and wrote the article 'Popedom' for the ninth edition of the 'Encyclopædia Britannica.'

Mul'lion, in architecture, a vertical division between the lights of windows, screens, etc. The term is also applied to the division between the panels in wainscoting.

Muloch, mū'lŏk, Sir **William**, Canadian educator and politician: b. Bond Head, Ontario, 19 Jan. 1843. He was graduated from the University of Toronto in 1863 and 1868 was admitted to the bar. He was first elected to the parliament of Canada in 1882 and was vice-chancellor of the University of Toronto from 1881 until 1900 when he resigned. He is postmaster-general of Canada and was instrumental in establishing the penny postal rate with other parts of the empire. Besides his public duties he is connected with many large financial interests.

Mulock, mū'lŏk, **Dinah Maria**. See Craik, Dinah Maria.

Mulready, mŭl'rĕd-ĭ, **William**, Irish genre painter: b. Ennis, County Clare, 1 April 1786; d. London 7 July 1863. He went to London while yet a child, and there his talent for art came under the notice of Banks, the sculptor, who assisted him in his education, and in 1800 he became a student of the Royal Academy, where he first exhibited in 1804. In 1806 appeared his 'Hampstead Heath' and in 1809 'Returning from the Ale House' and 'The Carpenter's Shop.' He was elected an associate of the Royal Academy in 1815, and to full membership in the following year, an honor won by 'The Fight Interrupted.' Although purely English in his education, subjects, and general treatment, Mulready's pictures, in color and characteristic care of detail, have often suggested comparisons of him with the Dutch painters. While popular in character, his work never descends to the merely vulgar or sensational, his representations of common life being properly dignified by the fidelity and thoroughness of his art. Besides those already mentioned, his best known works include: 'Giving a Bite' (1836); 'Snow Scene' (1842); 'Choosing the Wedding Gown' (1846); 'The Bathers' (1857); and 'The Wolf and the Lamb.' His illustrations to 'The Vicar of Wakefield' were very successful. Mulready became most widely known through the ornamental design which he furnished in 1840 for the postal envelope devised by Rowland Hill (q.v.). Nearly all of Mulready's best pictures are now the property of the English nation.

Multan, mool-tăn', or **Mooltan**, India, an ancient city of the Panjab, capital of a district, 164 miles southwest of Lahore, and four miles from the present bank of the Chenab. It is surrounded by a dilapidated wall, upward of three miles in circumference, and is overlooked on the north by a fortress. The principal manufactures are silks and fine cotton fabrics, while coarse cotton cloth is also produced for home consumption. Multan has an extensive foreign trade with the countries west of the Indus, and a large banking business is carried on by its merchants. The fortress built in 1640 stands on a mound of earth on the site of the old city. The vicinity is covered with a vast quannity of the ruins of tombs, mosques, and shrines. Many of these have been substantial edifices. Multan is one of the most ancient cities in India. It was taken by Mahmud of Ghazna in 1005; by Pir Mohammed for Tamerlane in 1398. After many vicissitudes it fell into the hands of the Sikhs, from whom it was taken by the British in 1849. Pop. (1901) 87,394.

Mul'tiple Stars. See Double Stars.

Multiplica'tion. See Arithmetic; Mathematics.

Mul″titubercula'ta, a group of fossil mammals, of uncertain position, so called from the many tubercles developed upon the molar teeth. The group ranges from the Jurassic to the Eocene periods. Little is known of the animals except about the lower jaws and teeth. The character of these last had suggested that these forms belong near the Monotremata (q.v.) in the sub-class Prototheria (q.v.). The propriety of the term and the characteristics of the group are discussed by Beddard, in 'Mammalia' (1902).

Mumbo Jumbo, an African superstition; a bogie, hideous and malignant, who is the terror of negro women and children.

Mum'michog. See Killifish.

Mummius, mŭm'ĭ-ŭs, **Lucius,** Roman consul: flourished about 185–130 B.C. He served as prætor in Spain and in 146 B.C. conquered Greece, where he burned and pillaged her finest cities, sending the art treasures of Corinth to Rome. He was made governor of Achaia with the surname Achaicus, and a triumph was held in his honor. He later became a censor, but of his last years and death little is clearly known.

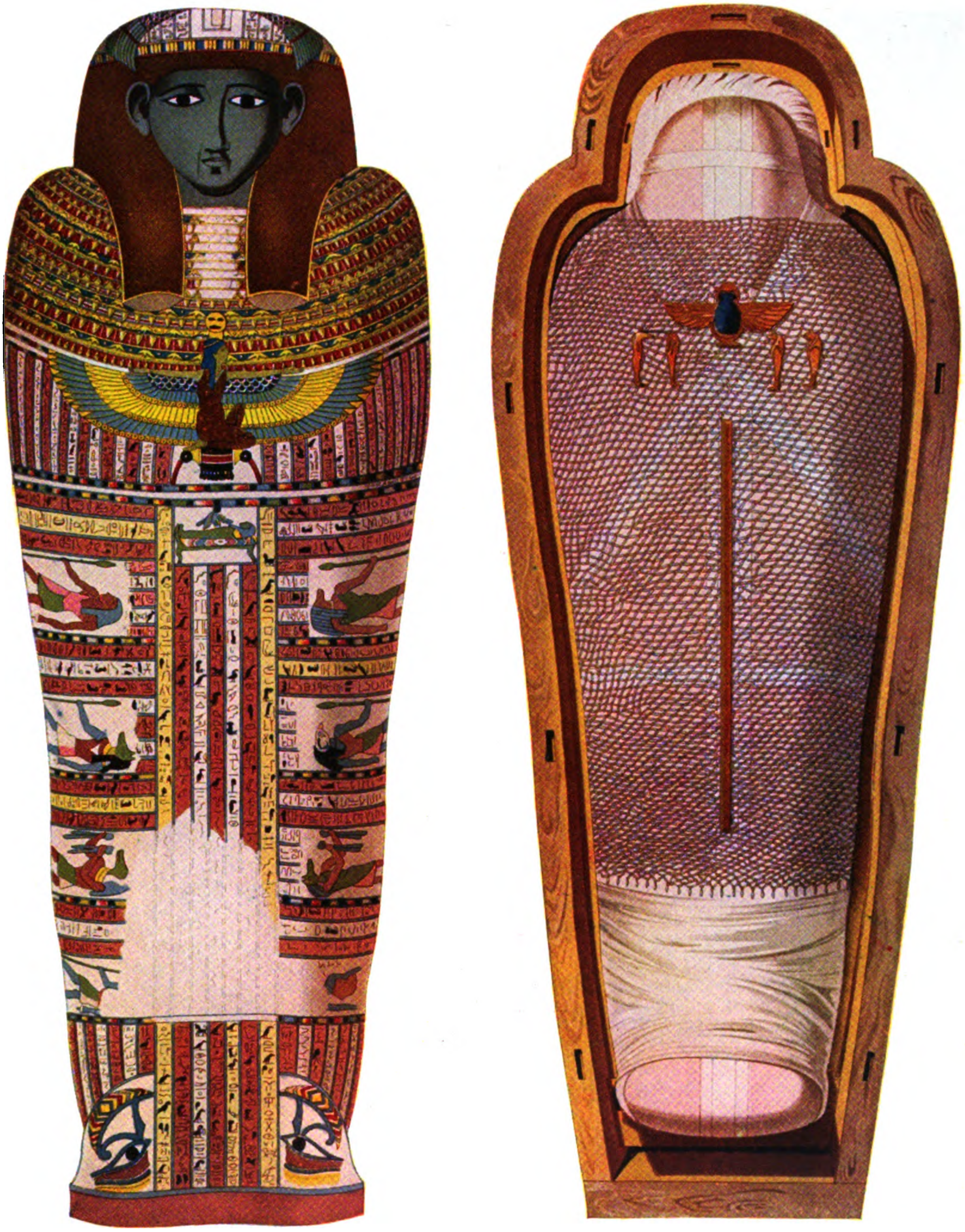
Mummy (Arab. *mumia*), a dead body preserved from putrefaction by embalming or other means. The custom of thus preserving the bodies of the dead has prevailed in several countries. Humboldt found mummies in Mexico, and in Peru the bodies of the incas were rudely embalmed and dried. The Guanches, or aboriginal inhabitants of the Canaries, removed the entrails of the dead, dried the corpse in the air, covered it with aromatic varnish, and, wrapping it in goat skins, kept it in a wooden case. These mummies, of which thousands have been found, are light in weight, of a yellow color, and have a strong aromatic odor. But it was by the ancient Egyptians that the art and practice of embalming the dead were carried to the greatest extent and highest perfection. All the dead of Egypt were embalmed in some manner, partly, it is supposed, from religious motives, and partly for sanitary reasons. The notion formerly prevalent, that the Egyptians preserved the body in order to keep it in a fit state to receive the soul when it should have passed through its allotted transmigrations, is inconsistent with the facts that tombs were sometimes sold to later occupants, and that animals of all kinds were also embalmed. The origin of embalming among the Egyptians has been attributed to their first merely burying in the sand, impregnated with natron and other salts, which dried and preserved the body, which natural process they afterward imitated, drugs and bitumen being later improvements. It is singular that few mummies of children have been discovered in Egypt, though even those just born were embalmed. Embalming was practised by the Hebrews to some extent. Joseph commanded the physicians to embalm his father, and in the time of Christ it was "the manner of the Jews" to bury the body "wound in linen cloths with spices." The practice continued in Egypt till the 6th century, and was common among the Greeks there, and even among the early Christians. It seems to have fallen gradually into disuse. See also Embalming; Egypt.

Mummy Wheat, a variety of wheat said to have been produced from grains found in an Egyptian mummy; but there is no good reason to believe the legend. It has long been in general cultivation in Egypt and neighboring countries in Africa. The spike is compound.

Mumps, a popular name for a contagious epidemic inflammation and enlargement of one or both parotid salivary glands, occurring usually in youth. In some localities it disappears for years, in other places it is endemic. Epidemics usually occur in the spring or fall. One attack generally gives immunity. The disease is sometimes preceded for a few days by malaise, loss of appetite, irritability, and feverishness. Its onset is marked by stiffness and pain about the jaws, followed by heat, pain, and swelling about the lobe of the ear, fever (100°–104° F.), more or less rigidity of the neck, with distortion of the side of the head, and difficulty in chewing, swallowing, and talking. The inflammation is usually at its height by the third day of the disease, and the disease has subsided generally by the seventh or tenth day. Very seldom is there any suppuration of the affected gland. In some cases the subsidence of the gland inflammation is followed by pain and swelling of the testes of the male, and of the ovaries, vulva, and breasts of the female. Occasionally a meningitis supervenes. The term mumps is sometimes applied to a parotiditis following a local injury, diseases of the mouth, diphtheria, occlusion of the salivary duct by a foreign body, etc. There is a secondary symptomatic or metastatic form of mumps which sometimes follows dysentery, scarlet fever, smallpox, measles, etc. The parotid gland in this form of mumps tends to suppurate. The best treatment for mumps consists in rest, the giving of saline laxatives and soft food, relieving the fever, and securing sleep by mild remedies, and keeping the face warm with flannel, or some other agreeable application.

Mun, Thomas, English merchant and political economist: b. London, England, June 1571; d. there July 1641. He engaged in mercantile business when very young, was interested in the Mediterranean trade and in 1615 was a director of the East India Company. As a writer on economics he presents really the first clear and systematic treatment on the subject and his is admitted to have been of great influence. He published 'A Discourse of Trade, from England into the East Indies' in 1621, and his greatest work 'England's Treasure by Foreign Trade' was published posthumously in 1664.

Mun'by, Arthur Joseph, English poet: b. Bulmer, Yorkshire, England, 1828. He was educated at Trinity College, Cambridge, and was subsequently admitted to the bar of Lincoln's



CASE AND MUMMY IN ITS CEREMENTS

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Inn. He has published 'Verses Old and New,' which contains the much admired pastoral poem 'Doris' (1865); 'Dorothy' (1880), which has been widely circulated in the poet's own country and in America; 'Vestigia Retrorsum' ('Steps Backward,' 1891); 'Vulgar Verses, by Jones Brown' (1891), mostly in dialect; 'Susan' (1893).

Munch, moonH, **Peter Andreas,** Scandinavian historian: b. Christiania, Norway, 15 Dec. 1810; d. Rome 25 May 1863. He was educated at the University of Christiania, and studied deeply into the old Norse language and antiquities. In 1841 he was appointed professor of history at the University of Christiania. He was accorded the unusual privilege of access to the papal archives in Rome, where he spent much time in study. His principal work is 'History of the Norwegian People' (1852–63). Munch published several works of a linguistic character, and, repudiating the term «Icelandic,» maintained that the so-called Icelandic literature was really Old Norse. He also translated several of the Old Norse sagas. A collection of his essays was edited by Gustav Storm (1873–6).

Munch, Peter Andreas, Norwegian poet: b. Christiania 19 Oct. 1811; d. near Copenhagen 27 June 1884. He was originally a student of law, but became an editor (1841–6) and professor in the university (1866) at Christiania. Among his writings are: 'Sorg og Trost' ('Grief and Consolation'), of which seven editions have been printed; 'Ephemera' (1836); 'King Sverre's Youth' (1837), a drama; 'The Singer' (1838); 'Poems Old and New' (1848); 'Pictures from North and South' (1848), in prose; 'New Poems' (1850); 'Lord William Russell' (3d ed. 1888), a tragedy; and 'An Evening at Giske' (1855), a historical drama. Munch translated into Norwegian many works from such authors as Tennyson and Walter Scott, and wrote some popular Norwegian songs.

Münch-Bellinghausen, mŭnH' bĕl'ĭng-how-zĕn, **Eligius Franz Joseph,** Baron von, better known as Friedrich Halm, Austrian dramatist: b. Cracow 2 April 1806; d. Vienna 22 May 1871. He studied law, and held various official positions at Vienna. In his lifetime his popularity as a dramatist was very great, and several of his plays were translated into English. 'The Gladiator from Ravenna' (1854, 5th ed. 1893) is considered his masterpiece. Among other of his plays are: 'Griseldis' (1834, 10th ed. 1893), which had great success; 'The Adept' (1836); 'Camoens' (1837); 'Imelda Lambertazzi' (1838); 'The Son of the Wilderness' (9th ed. 1894), famous in England and America under the title 'Ingomar'; 'Wild Fire' (6th ed. 1894), a romantic comedy.

Münchausen, mŭnH'how-zĕn, **Hieronymus Karl Friedrich,** Baron: b. Bodenwerder, Hanover, 1720; d. there 1797. He was a German soldier and served in his youth as a cavalry officer in the Russian army. He was possessed of an adventurous and dare-devil spirit, and an imagination that knew no bounds. He told the most wonderful stories of his adventures in the Turkish campaign of 1737–9, and soon became famous as the most unique exaggerator that ever lived. The tradition of the baron's story-telling is supported by the evidence of a clergyman, who says that in his old days the officer used to relate his most surprising adventures «in a cavalier manner, with a military emphasis, but without any passion and with the easy humor of a man of the world, as things which required no explanation or proof.» His tales are thought to have been first compiled by Rudolf Erich Raspe, a man of letters, who, being compelled to flee from his position as curator of the museum at Cassel to England on account of a charge of embezzlement, was engaged in London in literary pursuits, and is generally believed to have published anonymously an English edition of the stories under the title of 'Baron Münchausen's Narrative of his Marvelous Travels and Campaigns in Russia' (1785). A second edition, enlarged and ornamented, was published at Oxford in 1786, under the title of 'The Singular Travels, Campaigns, Voyages, and Sporting Adventures of Baron Munnikhousen,' commonly pronounced Munchausen; as he relates them over a bottle when surrounded by his friends. A third edition, published by Kearsley in London the same year, bore the title of 'Gulliver Revived.' One of the best editions is that by Shore (1872), illustrated by Doré, with additions by Theodore Gautier.

It is said that a large proportion of the hunting tales are derived from Henry Bebel's 'Facetiæ' (1508), while other incidents are borrowed from Castiglione's 'Cortegiano' and Bildermann's 'Utopia,' which are included in Lange's 'Deliciæ Academicæ' (1765).

München (mŭn'Hĕn) **Gladbach.** A town in the Prussian Rhine Province.

Muncie, mŭn'sĭ, Ind., city, county-seat of Delaware County; on the White River, and on the Chicago & S. W., the Lake Erie & W., the Cleveland, C., C. & St. L., the Chicago, I. & E., and the Cincinnati, R. & M. R.R.'s; about 50 miles northeast of Indianapolis. A belt railway encircles the city and furnishes intercommunication among the lines which enter the city. Muncie is situated in an agricultural region and in a natural-gas belt. In the vicinity are coal fields and glass-sand, and the river furnishes good water-power. The chief manufacturing establishments are iron and steel works, glass works, machine-shops, canneries, pulp and paper-mills, manufactories for silver and silver-plated goods, wagon and carriage works, and flour-mills. Other articles manufactured are gas engines and gas fixtures, men's clothing, knit underwear, caskets and undertakers' supplies. There is a large trade in the manufactures of the city, and in coal, farm products, and live-stock.

At Muncie once flourished the Eastern Indiana Normal University, a private school which in 1903 had over 400 pupils. The city has good public and parish schools, a public library which has over 14,000 volumes, a city hospital, courthouse and a number of fine churches. The government building cost over $80,000, and the new public library building $50,000. The electric-light plant is owned and operated by the city. Pop. (1900) 20,942; (1910) 24,005.

Mundé, mŭn'dā, **Paul Fortunatus,** American gynecologist: b. Dresden, Saxony, 7 Sept. 1846; d. New York 7 Feb. 1902. After coming to the United States in 1849 he attended the

Boston Latin school and then studied medicine at Yale. He left before completing his course, entering the Union army as medical cadet in 1864. He was afterward graduated from the Harvard Medical School in 1866, and went to Germany, where he enlisted in the Bavarian army. He was decorated by the emperor with the Iron Cross for heroism in saving the lives of patients from a burning hospital near Paris. After devoting himself to study and practice in hospitals in Berlin, Heidelberg, Paris, London, and Edinburgh, he took up his residence in New York in 1873, and practised obstetrics and gynecology. He was appointed professor at Dartmouth Medical College, and in the New York Polyclinic in 1882. He edited (1874–92) the ‘American Journal of Obstetrics,’ and was president of the American Gynecological Society in 1897–8. Among his works are: ‘Obstetric Palpitation’ (1880); ‘Minor Surgical Gynecology’ (1880); ‘Appendix to the Midwifery of Cazeaux and Tamier’ (1884); ‘Pregnancy and the Puerperal State’ (1887); and ‘Diseases of Women’ (1891).

Mundos, mŭn'dōs, heathen tribes living in the wilds of Panay and Cebu, Philippines. Little is known of their race and customs, and the name is a collective one applied to various different tribes.

Mundt, moont, **Klara Müller** («Mühlbach, Luise»), German novelist: b. Neubrandenburg Jan. 1814; d. Berlin 26 Sept. 1873. She was married to Theodor Mundt (q.v.) in 1839. She was an extremely prolific writer of popular historical novels, which though quite without merit in point of style are by no means wanting in descriptive excellence. They were all published under the pen name of «Luise Mühlbach» and have had as many eager readers in this country and England as in the writer's own land. Among them are: ‘Queen Hortense’ (5th ed. 1861); ‘Emperor Joseph II. and his Court’ (9th ed. 1866); ‘Marie Antoinette and her Son’ (1867); ‘Emperor Alexander and his Court’ (1868); ‘Mohammed Ali and his House’ (1871); ‘Frederick the Great and his Court’ (8th ed. 1882).

Mundt, Theodor, German author: b. Potsdam, Prussia, 19 Sept. 1808; d. Berlin 30 Nov. 1861. He studied at the University of Berlin, and in 1842 became private docent there. In 1848 he was appointed professor of literature and history at the University of Breslau, and in 1850 was recalled to Berlin as University librarian and professor. He belonged to the «Young German» school, was a Radical in politics, and favored the emancipation of women. His writings include: ‘Madonna, Unterhaltung mit einer Heiligen’ (1840), a memoir of Charlotte Stieglitz; the novels, ‘Thomas Münzer,’ ‘Carmela’ (1844); ‘Mendoza, der Vater der Schelme’ (1847); ‘Die Matadore’ (1850); the critical and historical works, ‘Kunst der Deutschen Prosa’ (1837); ‘Geschichte der Gesellschaft’: ‘Geschichte der Weltlitteratur’; ‘Geschichte der Litteratur der Gegenwart’ (1852); and political sketches included in ‘Pariser Kaiserskizzen’ (1856); ‘Paris und Louis Napoleon’ (1858); ‘Italienische Zustände’ (1859–60).

Munger, **mŭng'gėr**, **Theodore Thornton**, American Congregational clergyman: b. Bainbridge, N. Y., 5 March 1830; d. 12 Jan. 1910. He was graduated at Yale in 1851, and at Yale Theological School in 1855. He held pastorates at Dorchester, Mass., 1856–60; Haverhill, Mass., 1862–70; and Lawrence, Mass., 1871–5. He was for several years pastor at North Adams, Mass., resigning in 1885 to become pastor of the United Church, New Haven, Conn. He was prominent in his denomination as well as an active suppoter of municipal reform. He published: ‘On the Threshold’ (1880); ‘The Freedom of Faith’ (1883); ‘Lamps and Paths’ (1883); ‘The Appeal to Life’ (1887); ‘Horace Bushnell’ (1899); ‘Character Through Inspiration’; etc.

Mun'go, Saint, or **Kentigern**, the patron saint of Glasgow: b. Culross about 518; d. Glasgow 13 Jan. 603. He was baptized and brought up by Saint Serf, the head of a monastery at Culross. His name, Kentigern or Cyndegyrn (from *ken* and *tigearna*), means head lord, and it is said that it was exchanged by the brethren of the monastery for Mungo, the beloved, on account of the affection they bore him. On leaving Culross Kentigern took up his abode as a missionary priest near the site of the present Glasgow. Here he was chosen bishop, but having troubles with the king of the Strathclyde Britons, afterward took refuge at Saint David's in Wales, and while in that region founded a religious establishment under a follower named Asaph, which afterward became the seat of the bishopric of Saint Asaph. Redderech, king of the Strathclyde Britons, recalled him to Glasgow, where he acquired a character of great sanctity. The city arms of Glasgow are associated with various legends concerning Saint Mungo, and the cathedral is supposed to be built on the site of his monastery. The parish of Saint Enoch, in Glasgow, is so called from a corruption of his mother's name (Theneu). A Life, written by Jocelyn of Furness about 1180, was published in Pinkerton's ‘Vitæ Antiquæ Sanctorum Scotiæ.’ Consult: Skene, ‘Celtic Scotland.’

Mun'goos, or **Mongoose**, an ichneumon (*Herpestes griseus*), common in many parts of India, and closely akin to the Egyptian species ichneumon (q.v.). The mungoos is a burrowing, nocturnal, weasel-like animal, tawny yellowish-gray, 16 or 17 inches long, and with a long thick terete tail. It kills numerous birds sucking their blood and leaving the body uneaten. It also with great adroitness seizes and kills many snakes, the formidable cobra included, usually avoiding the serpent's stroke by its quickness. Its excitement and ferocity in these encounters is almost indescribable. It is, however, commonly domesticated as a mouser in the Orient, and has been colonized in various parts of the world to destroy vermin, usually with sad results; hence the bringing of a living one into the United States has been forbidden by law since 1902. This animal was introduced into Jamaica and some other islands of the West Indies about 1872, and later in Hawaii, in the expectation that it would overcome the plague of rats in the sugar plantations. It did so, but it multiplied excessively, killed off poultry and insect-eating birds, reptiles and mammals, which were useful. Many of these animals changed their habits somewhat to accommodate themselves to the novel enemy, and the mungoos does not now multiply so rapidly at first, and does less damage. The same experience was had elsewhere, and has warned other countries to avoid a repetition of it. Consult: Blanford, ‘Fauna of British India: Mammals’ (1889); Morris, ‘The Mungoos on Sugar Estates in the West Indies’ (1884); and ‘The Field’ (London, 13 July 1895).

Munich, mü'nik, or **Munchen,** mün'ʜĕn, Germany, the capital of Bavaria, considered to be “the most uniformly beautiful city in Europe,” lies on an extensive but uninteresting plateau, about 1,700 feet above sea-level, on the left bank of the Isar, with suburbs on the right, the river being crossed by nine bridges. The original nucleus of the town was at one time surrounded by walls and ditches, and entered by lofty turreted gates. The ditches have been filled up and the walls removed, but three of the old gates, with their loopholed and embattled flanking towers, still remain. In the older part of the town there are many old houses, irregular both in size and form, and of quaint but not unpicturesque architecture. This quarter, though it contains the government offices and many public edifices, is surpassed, both in extent and magnificence, by the new town, which has risen chiefly to the north and west, with almost unexampled rapidity and splendor, due to the art-loving proclivities of King Ludwig I. and his successors, who spent over 7,000,000 thalers in beautifying the city, and adorning it with buildings of almost every style of architecture, wide and handsome streets, and squares and gardens decorated with statues and other monuments. Near the centre of the city, between the Max-Joseph-Platz and the palace gardens, is the royal palace, consisting of an old central building of vast extent and two modern wings. From this great pile run at right angles to each other the two finest streets in Munich — the Maximilianstrasse and the Ludwigstrasse. The chief public buildings are the old town-house and the new, the latter in the Gothic style, considerably enlarged in 1899; the old palace and the Herzog Max Burg, now used as public offices; the post-office; the central station (1880); the chief customs house (1876–9); and the new palace of justice (1897). Buildings connected with art embrace the gallery of sculpture, or Glyptothek, an edifice of the Ionic order, containing a series of the finest ancient and modern sculptures; the Old Pinakothek or picture-gallery, another beautiful edifice, containing one of the richest collections of pictures in the world; the New Pinakothek, adorned externally with frescoes and containing only paintings by recent masters; the academy of arts, an imposing building in the renaissance style; the academy of the plastic arts (1885); the Schack gallery of paintings (1894), named from its donor; the Schwanthaler and Kaulbach museums, etc. Other collections are the Hof-und-Staats Bibliothek, with 900,000 printed volumes and 40,000 MSS.; the old Bavarian national museum, now used for art collections; the new Bavarian national museum (1899); etc. The chief theatre is the Royal and National theatre, with a lofty Corinthian portico. Munich is rich in monuments, which adorn its squares, gardens, and public promenades. Among the chief are the monument of Maximilian II., with his statue 26 feet high; and the colossal bronze statue of ‘Bavaria,’ 65 feet high. It is a hollow female figure, designed by Schwanthaler and cast from foreign cannon. From the head a fine view of the city and the Alps is obtained. It stands on a low eminence in front of the “Hall of Fame,” a Doric building of horse-shoe shape, containing busts of notable Bavarians. The “Gate of Victory,” in imitation of the arch of Constantine at Rome, and the Propylæa, in imitation of that at Athens, should also be mentioned. There is a fine statue of Maximilian I. by Thorwaldsen, and statues of Schiller, Gluck, Schelling, Fraunhofer, and Gärtner, a bronze monument to the Bavarian soldiers who died in the war with Russia, and a monument to the chemist Liebig. The Hofgarten is a garden near the palace, finely planted, and surrounded by an open and richly ornamented arcade; the so-called English Garden is an extensive and beautiful park. The cemeteries of Munich are noteworthy for their artistic tombs, probably the most beautiful in Europe. The ecclesiastical buildings include the cathedral, founded in 1488, a vast pile, entirely of brick, with two lofty towers, terminating in domes 333 feet high; St. Michael's or the Jesuits' Church (1583), a handsome Italian structure; the church of the Theatines, another Italian structure, beneath which are the burial vaults of the royal family; the church of St. Louis, a modern building of brick, faced with white marble, decorated externally with statues by Schwanthaler, and internally by the finest frescoes of Cornelius; the church of All Saints; the basilica or church of St. Boniface; the Mariahilf church on the right side of the river; the three Protestant churches; and the Jewish synagogue. At the head of the educational institutions is the university. (See MUNICH, UNIVERSITY OF.) Closely associated with it are the university library with 400,000 volumes and 2,000 manuscripts; the Collegium Georgianum (1494), a priests' seminary; the Maximilianeum (1852), etc. There is also a high school of technology, and numerous other high class institutions for educational purposes. The industrial development of Munich lags behind its æsthetic development. Its stained-glass works, iron, brass, and bell foundries, lithographing and engraving works, and manufactories of optical and mathematical instruments, and various artistic articles, are, however, deservedly noted. Still more famous are the enormous breweries of Bavarian beer, which annually produce about 49,000,000 gallons, of which 37,000,000 are consumed in the city itself. Munich carries on a large trade in grain and in objects of art.

In 1158 Henry the Lion raised the *Villa Munichen* from its previous obscurity by establishing a mint and a salt-emporium within its precincts, the name (also appearing as *Forum ad Monachos*) being derived from the monks who owned the site. In the 13th century the dukes of the Wittelsbach dynasty selected Munich for their residence and fortified the town. In 1327 the old town was nearly destroyed by fire, and was rebuilt by the Emperor Louis the Bavarian; it was not until the fortifications were razed at the close of the 18th century that the limits of the town were enlarged to any extent. The true history of modern Munich is the account of its artistic development in the 19th century, closely identified with which are Klenze and Gärtner the architects, Schwanthaler the sculptor, Cornelius and

Kaulbach the painters, and Wagner the composer. The modern Munich school of painting, headed by K. von Piloty, W. Diez, and Grützner, is characterized by marked realism in color and detail, in contrast to the romanticism of the older masters. The elevated site of the city and the neighborhood of the Alps render it liable to sudden changes of temperature, sometimes ranging over 20° in 24 hours. The population in 1801 was only 48,885, in 1900 it was 499,959; from 30.4 per thousand in 1871 the death rate fell to 24.1 in 1898.

The University, the Academy of Fine Arts, and the Conservatory of Music, under the leadership of men of world-wide reputation, and the splendid facilities of the city in its theatres, museums, and galleries, its handsome buildings and healthful location, attract thousands of visitors to Munich every year.

Munich, University of, an important German university, located in Munich, Bavaria. It had its beginning in the Studium Generale of Ingolstadt, founded by the Emperor Ludwig, with a special bull of approval by the Pope, Pius II., in 1459. The University of Ingolstadt opened its doors in 1472; and after more than three centuries of continuous struggle and growth, and during which time it remained in the faith and under the influence of the Church of Rome, it was removed by Ludwig Maximilian in 1800 to Landshut. In 1826 it was reorganized and transferred to Munich, where with increased facilities it has grown steadily in attendance and influence. The university has faculties of theology, law, medicine, philosophy, political science, etc., and numerous seminars and clinics, a botanical garden, museums, laboratories, and an observatory; and has access to the libraries, museums, and art treasures of the city. The University Library contains almost half a million volumes, besides many manuscripts, pamphlets and records. The professors and instructors number about 200 and more than 4,000 students are in average attendance. The annual income averages $250,000, in large part contributed by the government. Affiliated with the university are the Collegium Georgianum, for the education of Roman Catholic priests, founded in 1494, and the Maximilianum, a secondary school, founded 1852.

Municipal Accounting may be termed a by-product of increasing municipal activity. This began with what is commonly known as the industrial revolution. The establishment of the factory system, the abandoning of home production, or the "domestic system," the drift of population away from country estates and agricultural employment, the increased need for making provision for the health, comfort, convenience, and for the social order of crowded settlements and fast growing cities have forced on local government activities which have made its officers responsible agents for great business corporations. Within a few decades the small trading towns on the coast and inland lines of transportation in England and continental Europe had grown from mere villages, or a collection of villages, to the proportions of cities; and the proper administration of government came to involve expenditures of millions where before only hundreds or thousands of public revenues were required. In the borough or the town the officer had immediate contact with every detail of public expense and his own experience was sufficient guide to administrative control. Increase in municipal functions forced him to rely on employees and agents, and he soon came to be dependent on them for a knowledge of details; an understanding of the financial transactions of the larger community could be had only through a well devised system of accounts.

Accounting is a method of collecting, classifying and co-ordinating the financial data pertaining to an enterprise, public or private. As a method of collection, accountancy attempts to make a complete record of financial transactions; as a method of classification it aims to assign accurately each financial fact to an administrative department or category to which it properly belongs; as a means of final co-ordination its object is to finally bring all the data to a single subject of account into form for a complete understanding of related details. Thus by process of original record and restatement, not only does a system of accounts give a complete history of the business as a whole but also a chronological, as well as summarized, statement of transactions pertaining to each administrative interest; and, through final summaries, exact knowledge may be brought to the attention of the administrator of every relation that is important in the management of affairs. Judged, therefore, both from its methods and from its results, accountancy has come to be a true science of financial record — a science which is fundamental to controlling judgment, both with respect to past operation, and as pertaining to provisions to be made for the future, in enterprises that are too large for the personal contact of a single head.

In the development of methods which will properly record financial transactions and reduce these records to reliable statistical statements, accounting has followed all the transformations of business itself. With each advance in complexity, and with each widening of the scope of enterprise the adoption of an improved system of records which will insure authentic results has been imperative. Private concerns have been able to survive under such conditions only that those in control may have a complete mastery over details. When intelligent direction has become impossible the private institution has failed and its business has passed to its competitors. Scientific accounting methods were first worked out in private life as a matter of survival. The public corporation, however, has not been subject to this law. Peace and social order must be preserved at any cost; public health must be protected; public convenience has commanded service of the government as the only institution which could properly represent the public welfare. The government could not die and the corporation, empowered with governing activities, has been allowed to pass on from generation to generation inheriting methods which were inaugurated under conditions that required little or no provision made for authentic record of official conduct.

Analogy with private business may still further illustrate present conditions of municipal account. From primitive to modern accounting there have been three steps, namely: A system of partial accounting and two systems of complete accounting. The two systems of complete accounting are commonly known as "Single Entry" and "Double Entry." Of these two last named, Single Entry is the more primitive. Single entry accounts attempt to make a complete record of transactions, but in classification the financial data are finally co-ordinated around proprietary interests only. Single entry accounts attempt to state proprietary assets and proprietary liabilities, but do not record anything with respect to current business operation. In these, under the single entry system, profits are arrived at through balancing off appraised valuation of assets against liabilities. No attempt is made to show current operations and no account is taken of earnings and expense. With the introduction of highly complicated and highly centralized industrial and commercial organization, under corporate control, most of the administrative problems came to be centred in operation — hence the necessity for the introduction of other accounts for the purposes of final classification. To provide such information the "Double Entry" system was devised. Under such an accounting plan not only may the cost of each article of product be determined, as a guide to estimating profit in price making on each particular sale, but the results in net earning of the gross business may be accurately determined from the books without inventory and valuation of assets and the closing of accounts representing proprietary assets and liabilities.

The public corporation and enterprises conducted by the government have been less fortunate in the development of methods which would show expenses (or cost of administration), revenue (or current income), transactions with respect to corporate properties, and liabilities outstanding. Municipal accounting has developed not as a condition necessary to survival but in response to a public demand for municipal reform. This movement first began in Europe and has reached its highest development in Great Britain where scientific accountancy had become first established as a necessary means of administrative control over large private undertakings. For public protection, the established methods of accounting were first applied to joint stock companies. Among the first Acts directed toward this end were those following railway speculation in the fourth and fifth decades of the century just closed. The abuses which had grown out of this character of promotion and the failures which had followed the absence of a strict financial control were the reasons for the enactment of the Companies Clauses Consolidation Act (8 Vict., c. 16). Under the provisions of this Act, auditors were to be appointed by the stockholders of corporations at their regular meeting, and these auditors were empowered to employ accountants to assist them in making special reports or in confirming the reports prepared by the officers themselves for the information of stockholders. The reports of auditors so appointed were to include a certificate as to the correctness of the balance sheet, in which was to be set forth the capital stock and credit liabilities, the accounts due to the company and the properties of every description. They were also to give a "distinct view of the profit and loss which shall have arisen in the transactions of the Company in the course of the preceding half year." It was further provided that no dividends should be declared except out of profits and that dividends should never be apportioned to stockholders when this would result in the impairment of capital resources. Gradually statutory provisions requiring appointment of auditors either by the stockholders of companies at their regular meetings or by the Board of Trade were extended to include public gasworks, public waterworks, commercial banking companies, savings banks, university and college estates, judicial trustees, county officers, etc. In the movement toward political reform a Local Government Board was finally created (1871) which would force upon all of the County Councils, Municipal Corporations, and Town Councils (except those of the larger cities) a uniform system of accounts, complete audits of account, and reports to the government of the financial operation as well as financial condition of local governing bodies. The same spirit of reform and the same necessity for providing a system which would furnish exact knowledge of details and summaries of results as a means of better administrative direction and control, induced the larger municipalities to employ professional accountants to instal improved systems of financial record and to audit their accounts periodically.

As it was in Great Britain that modern industry first found its highest development, so it was there that accountancy was first raised to the plane and dignity of a profession. The "Companies' Acts" and supplementary legislation requiring the appointment of independent auditors contributed much to the development of the science by making its requirements general in the management of large affairs. Instead of leaving the science to be slowly evolved by a process of natural selection of methods, the several Acts of Parliament, making audits and reports compulsory, immediately brought the talents of thousands to the task of specialization in this field. When the Local Government Board was organized, in 1871, the London Institute of Chartered Accountants (a chartered body of professional accountants) had already been in existence nearly twenty years and similar professional bodies had been organized among the accountants of Scotland and Ireland. The application of accounting methods to English municipal governments, therefore, was a comparatively easy task. The public corporation had grown too large for the effective use of partial and primitive systems of financial record; these had long since failed to serve the public administrative need. When English accountants were asked to turn their talent to municipal work they had simply to apply the principles and methods of scientific accounting to which they had long been accustomed (in the classification of financial data of gas companies, water companies, railways, and the large industrial and commercial corporations, making such changes only as were made necessary by the public character of the enterprise.

Theretofore municipal accounts had been little more than cash book entries and treasury statements; the efforts of local communities had been directed toward holding the officers of government to strict account in the handling of public funds. The first efforts toward reform were for the protection of the taxpayer against fraud and misappropriation. To this end a strict account of receipts and disbursements had been required and the accounts and reports of municipalities were little more than detailed or classified statements of the public treasury. When, however, municipal functions had become multiplied and municipal activities had grown too complex to allow of an intelligent grasp of details by those in control, the futility of the cash book system became apparent. From the best records that might be made and the best summaries deducible from records of the flow of cash no notion might be had of the real problems of administration. What the officer would know and what the taxpayer was primarily interested in as a matter of strict economy was the current cost of government and the current revenue provisions to meet this cost. It was also necessary to have a complete accounting for the various properties belonging to the city (other than cash) and a complete statement of credit obligations. None of these results could be obtained from a record of receipts and disbursements. The municipalities had been using a system of partial account only, and the larger problems of financial administration which confronted them demanded not only a system of complete financial account but also one which would show both municipal operative results and transactions pertaining to municipal assets and liabilities — that is, a complete double entry system.

Applying the principles and the methods to which they were accustomed in the analysis of financial data and final summarization of accounts for the railway and other large private corporations accountants found that the categories necessary to show costs of administration were almost identical with what they had been accustomed to set up as the expense account of private undertakings; and in lieu of earnings in private accounts a statement must be made of current revenues accruing to meet expense incurred. The net result of these two classes of accounts would show revenue surplus and revenue deficit of the municipality for the year, or other period stated, instead of net earnings. In other words, these two classes of accounts exhibit the true financial results of municipal operation for the year, but none of the data collected in either class had any reference to cash receipts or cash disbursements. Under the double entry system, when an expense was incurred it was at once set up in its proper classification both as an expense and as a current liability of the city. The cash payment when finally made had no reference to the expense but simply operated to reduce amount of current liabilities and to correspondingly decrease the cash assets of the treasurer. On the other hand, revenues were spread upon the books as soon as they accrued and became payable; of these a double entry was made, first in a proper revenue account, and second as a current asset. Payment of revenue into the treasury or cash received did not in any manner affect the revenue account but operated to reduce an assets receivable account and to increase the amount of cash in the treasury.

While modern systems of accounting take no notice of the flow of cash as a means of showing the results of operation in net earnings or in revenue surplus or revenue deficit, receipts and disbursements become an important exhibit in those accounts intended to portray financial condition. These accounts are those ultimately collected in the balance sheet and are sometimes referred to as proprietary accounts to distinguish them from those designed to show results from operation. Municipal properties and municipal liabilities can be affected in only four ways: (1) They may be increased or decreased by cash transactions; (2) they may be increased or decreased by credit transactions; (3) assets may be decreased by depreciation and liabilities may be increased by reserves set up to cover depreciation; and (4) assets may be decreased by loss of property or the liabilities may be increased by reserves set up to cover loss. To give a true picture, therefore, of transactions pertaining to proprietary assets and liabilities and as a means of holding officers to strict account, summaries must be shown representing present financial condition, and exhibits must be made which will properly set out the transactions of cash and credit, as well as the reserves or provision made to cover depreciation or loss, through which the changes in proprietary accounts have been affected. It is as a means of illuminating the cash assets account and of giving assurance as to the correctness of cash balances represented, only, that exhibits of receipts and disbursements are important.

Under the English system of municipal accounting the assets and liabilities or the accounts which are finally stated and summarized in the balance sheet are again divided into two classes, viz.: (1) Those showing current and contingent assets and liabilities and (2) those which show transactions and the final result of transactions pertaining to the permanent properties and the funded debt of municipalities. The latter of these two classes is set up in their reports as capital accounts. A statement of cash receipts and disbursements (or of transactions of the municipal treasury) with respect to these two classes of properties and liabilities is also distinguished. Cash receipts and disbursements which pertain to or affect current assets and liabilities are called ordinary, while those which pertain to or affect capital accounts are denominated extraordinary. These terms, however, pertain to no other class of accounts than cash and have no real significance in exhibits other than detailed or classified statements of receipts and disbursements.

In America, accounting ideals long languished and financial records were retained in innocent simplicity and primitive confusion long after the science had become well established in England and Scotland. During the period that accountancy was being erected on the high plane of a profession in Europe, commerce and industry were on the Western Continent first beginning to feel the need for a method which would insure integrity of summaries of financial results. Till the middle of the 19th century America was a highly individualistic agricultural community. The American farmer needed no accounts other than a simple statement of cash receipts and payment and a memorandum of credit obligations. Before 1830 the bank was about the only enterprise of large capital and its transactions were treated as cash. In 1820 the city population of the United States was only 4.93 per cent and there were only 13 cities having a population over 8,000. The census of 1850 showed an urban population of only 12.49 per cent; at this time the American Transportation Company was about the only concern whose volume of business and breadth of organization demanded a modern method of account. And it has been in the railway service that most of the American accountants have received their training.

After the Civil War, industrial and commercial enterprises came to take so prominent a place in our national life that the current of population set strongly toward the city and a process of centralization was begun similar to that felt by Great Britain about a century before. In 1900, about one half of our population was found by the census takers in large cities, and, in the most highly industrial portion, namely, the North Atlantic Division, only 31.8 per cent remained in rural employment. The sudden development of the municipalities, the hopeless chaos in municipal administration, the known mal-practice in public office, and the abortive attempts on the part of honest officials to locate responsibilities as well as protect themselves against the suspicion of corruption which the public had come to entertain toward all those connected with local government (as a result of the peculations of the few and of the organized political plunder to which the public treasury was subject) have within the last two decades raised up a universal demand for municipal reform which has brought the combined intelligence of honest citizenship to the solution of the means necessary to its accomplishment. In America, as in England and in continental Europe, attention was first called to attacks on the public treasury and to the subversion of public funds to private use. As a means of protecting the taxpayer against the misapplication of cash received, the first step toward reform was the creation and election of independent treasury officials and the publication of detailed treasury reports. These have served as a protection against fraudulent inroads on the treasury, but have done much to confuse ideals of municipal accounting with statements of receipts and disbursements.

The need for a system of complete accounting in American municipalities as a first premise to municipal reform has in recent years been enlarged on by many, but by none has it been more forcefully expressed than by Nathan Matthews, Jr., of Boston, who was elected mayor of that city in 1891. Boston at that time was better equipped, perhaps, than any other American city for furnishing the kind of data needed for an intelligent administration, yet Mr. Matthews in his first report calls the attention of the people to their helplessness in the following language:

> Called to the chief magistracy of the city without previous service in the government and believing that the first duty of a public officer charged with the disbursement of millions of dollars of public moneys was to search the printed reports of the city government for accounts that would show the cost from year to year, of equipping and of maintaining the various departments of municipal service, I was amazed to discover that practically there was none. I have in consequence been obliged to devote an inordinate amount of time to the work of securing this information and of arranging it in convenient form for use, the time thus spent amounting to several hours per day for weeks at a stretch.

In this statement Mayor Matthews brought into strong contrast the cash account system and the needs of the administration for authentic statements and summaries of accounts which will show "the costs from year to year of equipping and of maintaining the various departments of municipal service" as well as the revenue provisions made by government for meeting this expense.

In many departments of our large cities even memoranda of account were found to be almost entirely lacking. The Comptroller of Chicago in his report (1897) points to the confusion in the Special Assessment Bureau as follows,

> Too severe criticism cannot be made upon the lack of system prevalent and the absolute neglect to post the books of accounts in the Special Assessment Bureau of the Department of Public Works in past administrations. It was discovered by this administration soon after it came into office that the books of account of that Bureau were more than five years unposted.

As late as 1901 the Fassett Commission investigating the accounting methods of the cities of the State of New York reported

> That the system of accounting in the several cities is more unintelligible and chaotic even than the laws under which the cities themselves are administered. . . . We believe that there can be no wise legislation with reference to the government of cities unless it be possible for the officers of the State, and especially for the Legislature and the Governor, to be able at all times to know with definiteness and certainty the facts relative to the general condition of municipal administration in each of the cities, and more particularly the exact financial situation in each and all of them.

The general awakening in America has not been without results. The city of Boston under the revised ordinance of 1898 empowered the City Auditor with the approval of the Mayor to designate expert accountants to examine the books and departments periodically. In a number of the States a movement has been inaugurated to create a board, or officer, of central control over municipalities and local governing bodies with powers similar to those enjoyed by the Local Government Board of Great Britain. The State of Ohio has recently enacted a complete Municipal Code which applies to the principal cities and towns of the State, giving them uniformity of administrative organization and which provides for a system of accounts that will show revenue and expense. The same law enacted a State Auditor or Comptroller of Municipal Accounts, with power to prescribe forms and to require reports which will insure accounting results. Other States have introduced uniformity in accounts for county and town organizations. Generally speaking, however, American municipalities and local governing bodies are still attempting to work out their administrative problems from the cash book and even in States where the law requires a statement of revenue and expenses, attempts are made to reach such a result through supplementary schedules, still making the treasury statement of receipts and disbursements the principal feature of their system. American municipal accounting officers have not yet risen to the dignity of professional accountants; few of them have such a knowledge of the principles and methods of accounting that they appreciate the futility of the cash book system. Even in cities like New York and Boston the cash book system is still retained. Their reports show little else than the flow of cash as exhibited in summaries of receipts and disbursements. Neither the officers of American cities in responsible positions, nor the taxpayers have any means of determining from such a system current expenses or annual cost of administration; no accurate statement may be made of revenue accruing to cover costs; there is no intelligent guide in making appropriations and no means of ascertaining revenue surplus or revenue deficit; budgetary estimates as a basis for taxation, and statements of revenue and expenses as a guide to administration, are rendered impossible except through such process of rough approximation as that described by Mr. Matthews in his report to the citizens of Boston.

Chicago was the first large American city to adopt a system of accounts adequate to meet administrative needs. As shown in a paper recently read before the Detroit Conference of the National Municipal League (April 1903),

> Within fifty years Chicago had grown from a village to a municipality of two millions; it had begun with a small town organization, as its population and territorial jurisdiction had spread over the surrounding prairies and swamps, primitive local governments had been incorporated by consolidation rather than by process of readjustment and reorganization. . . . The City of Chicago had finally come to include more than twenty separate taxing jurisdictions, over which it had little control and between which there was no well defined method of co-operation for common ends; the financial side of the administration had become unmanageable and the government in all its activities was crippled. Recognition of this situation on the part both of citizens and of officers of administration was the first step towards reform. Citizen activity and discontent were in evidence on every side.

The Mayor and Council were alive both to the public demand and to the probable results of public censure in case their own incumbency was not relieved from suspicions which were sure to follow. As a result, Haskins and Sells, public accountants, were employed to devise and instal a complete system of accounts which would meet the administrative needs of the city. The general features of the new system adopted as a result of this employment closely follow that in use by the English municipalities. In each department and office is kept a complete record (or original entries) of all financial transactions pertaining thereto. These are finally collected in the Comptroller's office, and co-ordinated in final summaries of revenues and expense (or operative results) and assets and liabilities (or statements of financial condition). The important administrative features of this system are represented in detail in the report of the Comptroller for the year 1902, as follows: (1) Uniformity of accounting methods in all departments; (2) Concentration of accounting in the Comptroller's office; (3) Collection of all revenue by the City Collector; (4) Daily remittances; (5) Monthly reports to the Comptroller and monthly balances between the Comptroller and all departments; (6) Financial reports published monthly by the Comptroller; (7) The organization of an Audit Bureau and a methodical plan of auditing by officers and employes retained especially for that purpose independent of all departments; (8) Accrument of all revenues on the general books of the city where they stand as evidence of obligations due to the city until paid; (9) Approval of all contracts and requisitions for supplies by the Comptroller to prevent departments from incurring liabilities in excess of appropriations; (10) The issuance of all fiscal stationery, forms, and receipts, consecutively numbered by the Comptroller and holding the departments responsible for their use or cancellation; (11) The use of graduated stubs or coupon receipts for the collection of money; (12) The establishment of a complete chain of accounting from the inception of revenue and expense throughout the various branches of the city to the Comptroller's office, where all of the auditing is finally concentrated.

The administrative results of such a system are also set out in the same report. The installation was so managed so as not to interfere with the current business of the city; the work was simplified in such a manner that clerks of ordinary ability might perform the duties required; instead of making necessary an increased clerical force the annual administrative expense was reduced over $72,000; beside, the new system had "improved the efficiency of individual employees and promoted an intelligent and interested direction of their efforts by departmental heads." Another result of bringing revenues accrued prominently before the administration. There was an increase in cash collections of nearly $500,000 in miscellaneous revenues alone. It may be further noticed that in the report above referred to only a brief summary is made of cash receipts and disbursements, the books of the treasury and the audited voucher system of account being considered an adequate protection against official infidelity. The body of the Comptroller's report is devoted (1) to classified summaries and detailed exhibits of revenue and expense; and (2) to classified balance sheet summaries and detailed exhibits of municipal assets and liabilities.

Prominent among the many American societies which have taken a serious interest in municipal accounting reform, is the National Municipal League. This society was organized in 1894, and is composed of members and representatives of local reform organizations. In 1899 the League appointed a special committee to further the interest of uniform municipal accounting and statistics. The first task to which the committee put itself was to work out a classification of administrative interests and purposes which might serve as a basis for accounts and statistics. This classification was published in 1900, and formed a part of the "Municipal Program" of the League. The main interest of the committee being one of bringing the present accounts and reports of municipalities into such uniformity as would form a common basis for comparison, the classification and schedules adopted were applied by the committee to treasury accounts — or cash receipts and disbursements — only. As these schedules have been recognized and adopted by a large number of American municipalities and have been made the basis for the statement of treasury accounts a general outline is here set up.

RECEIPTS AND EXPENDITURES.

I. General Government.
1. Mayor — Office.
   (a) Salary of Mayor.
   (b) Other expenses of city executive.
2. Legislative.
   (a) City Council.
   (b) City Clerk.
3. Law Department.
4. Finance Department.
5. Bureau of Elections.
6. Public Printing.
7. Buildings not in other departments.
8. Registration.
9. Other general.

II. Protection of Life, Health and Property.
1. Police.
2. Fire Department
3. Courts.
4. Jails, prisons and reformatories.
5. Health Department.
6. Cemeteries.
7. Building Department.

- 8. Militia and armories.
- 9. Miscellaneous.

III. PUBLIC CHARITY.
- 1. Hospitals.
- 2. Insane.
- 3. Houses for aged, deaf, dumb, blind, etc.
- 4. Almshouses and workhouses.
- 5. Lodging-houses.
- 6. Outdoor relief.
- 7. Miscellaneous.

IV. PUBLIC WORKS.
- 1. Administrative expenses.
- 2. Opening and grading streets.
- 3. Street paving.
- 4. Sidewalks.
- 5. Street cleaning.
- 6. Street sprinkling.
- 7. Street lighting.
- 8. Garbage collection and disposal.
- 9. Snow removal.
- 10. Sewers and sewage disposal.
- 11. Bridges.
- 12. Miscellaneous.

V. PUBLIC INDUSTRIES.
- 1. Waterworks.
- 2. Gasworks.
- 3. Electric light plants.
- 4. City real estate.
- 5. Markets.
- 6. Docks and wharves.
- 7. Transit subways.
- 8. Subways for pipes and wires.
- 9. Miscellaneous.

VI. PUBLIC EDUCATION, RECREATION AND ART
- 1. Schools.
- 2. Libraries.
- 3. Museums and art galleries.
- 4. Parks (*a*)
  - (*b*) Playgrounds.
  - (*c*) Gymnasia.
- 5. Baths.
- 6. Celebrations.
- 7. Miscellaneous.

VII. TRUST FUNDS.

VIII. MISCELLANEOUS.

IX. TAXATION.
- 1. Real property.
  - (*a*) Lands.
  - (*b*) Buildings.
- 2. Personal property.
- 3. Poll taxes.
- 4. Liquor licenses.
- 5. Franchise tax.
- 6. Receipts from franchise rights.
- 7. Special assessments.
  - (*a*) Street opening.
  - (*b*) Street paving.
  - (*c*) Sidewalks.
  - (*d*) Sewers.
  - (*e*) Other purposes.
- 8. Miscellaneous.

X. PUBLIC DEBT.
- 1. Interest.
- 2. Sinking fund.

XI. TOTALS OF RECEIPTS AND EXPENDITURES (TO THIS POINT).

XII. CASH BALANCES AT BEGINNING AND END OF FISCAL YEAR, RESPECTIVELY.

XIII. GRAND TOTALS OF BOTH SIDES OF THE ACCOUNT (BALANCED).

Having worked out a general classification of subjects of administrative interests, and having successfully applied these to the treasury accounts of American municipalities, the committee, under instructions from the National Municipal League, undertook to apply its schedules to the other controlling accounts and to report on a complete system of municipal accounting and statistics. For this purpose the double entry system was adopted and the detailed accounts were divided into two general classes, namely, (1) Operative Accounts, showing cost of municipal administration and municipal revenues accrued to meet the current expenses incurred, and (2) Proprietary Accounts, showing assets and liabilities. Thus, in general, they follow the plan adopted by the English municipalities and applied to this such a classification as a basis for co-ordination of financial items and details as are suited to American conditions. Recognizing the separate and independent organization of the office of Comptroller and the office of Treasurer under American municipal charters, separate outlines for reports by these two officers are planned, the report of the Comptroller to show all of the controlling accounts arranged in such manner as to exhibit a complete resumé of operations and financial conditions, the report of the Treasurer to exhibit the flow of cash and balances of cash on hand.

The awakened deep interest in municipal accounting is one of the most hopeful promises of permanent reform in municipal administration.

E. ALLEN FROST,
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Municipal Art Societies, organizations in the various large cities of the United States, devoted to the promotion of municipal art, and the making of the city beautiful. Among these organizations are the Municipal Art Societies of New York, Chicago, Cincinnati and Baltimore; the American Park and Out-Door Association; the Fairmount Park Association, etc. See ART, AMERICAN; PARK.

Municipal Debt. See DEBT; FINANCE, *Municipal.*

Municipal Government. Cities are centres of influence for good or ill. In industry, commerce, science, culture, thought, they lead the world and largely determine its destiny. If city populations are corrupt, immoral, illiterate, depraved, the whole nation is contaminated. If their government is a failure, the state is endangered, both because the cities have such a large proportion of the population and because the character of the whole country is so largely influenced by city conditions. New York city has a population greater than the 13 colonies when they broke away from Great Britain. Its wealth is 20 fold that of the United States when the Constitution was drafted. Its present annual expenditures are one fourth of those of the Federal government. Its net debt is one third of the national indebtedness, including the bonds still outstanding for the Civil War, and 30 fold the debt of New York State.

Growth of Cities.— Population is concentrating at a rapid rate. In 1900, there were 62 cities in the United States that had a population greater than New York in 1800. During the 19th century, the percentage of the population living in cities over 8,000 increased from 3.97 to 33.1. The number of such cities grew from 6 to 545, and their combined population from 210,873 to 24,992,199 — 118 fold; while the remainder of the country, including all towns below 8,000, grew from 5,097,610 to 50,485,268 — less than 10 fold.

The drift cityward is not confined to the United States. Every progressive country of the Eastern and Western hemispheres bears witness to the universal trend. In England and Wales, two thirds of the people live in cities over 8,000. In Prussia, Belgium and Holland the ratio is higher than in the United States; and in several other European and South American countries the proportion is nearly as large. The causes of urban growth are principally economic. The great improvements in manufacture, mining, agriculture and transportation have made it possible for a larger and larger proportion of the population to turn to pursuits other than the extractive industries. Wants have multiplied with increasing wealth, and for their satisfaction, new industries have sprung up. Since nearly all industries outside of agriculture can be conducted better in populous centres than in rural localities, they have located in cities, and there the people connected with industry and commerce have concentrated. Others have been drawn cityward by social advantages — theatres, operas, libraries, schools, etc., for the cities are the centres of culture, art and science, as well as trade and industry.

Congestion of Population.— This increasing concentration signifies not merely the union of millions under one municipal government but, what is far more important, a congestion of population which has never been equaled. The steady reduction in the space allotted to each person and the piling of house upon house have brought within the confines of a single city block a larger number of persons than the whole population of some cities. According to the last census there were in the Eighth Assembly District of New York 72,125 persons. If the whole city were as densely populated, it would contain every man, woman and child in the United States, the Territories, all of the islands recently acquired and also Mexico and Canada — all of North America. Foreign cities do not have usually as many persons per unit of ground area as American cities; their buildings are not so high. London's densest quarter does not contain one half as many persons per square mile as the lower East Side of New York city. But there is great congestion and squalor in London, nevertheless.

From this congestion, the ceaseless contact of person with person, the great density, most of the problems of municipal government spring. Expensive health departments are not needed in the country; the individual protects himself against disease. Street paving and cleaning are simple problems. Each person looks after his own water supply, transportation, lighting, etc. Public service corporations cannot exist without thickly settled centres, and franchise questions do not perplex frontier districts. Home rule is not discussed. Even the village has a very simple form of government. In the city everything is changed. Elaborate health, fire, police, water supply and transportation systems are necessary. The citizen comes into too close and too constant contact with his fellows to be permitted to do as he pleases. There must be new laws, more administrative departments and a different form of government throughout. New problems arise, such as housing, home rule, public ownership and civil service — all of which, in ultimate analysis, find their origin in the great density of population.

City v. Country.— Although cities have existed ever since the dawn of authentic history, and although they have held at times absolute sway over the rest of humanity, the modern city is the outgrowth of the last century or of the last 150 years at the most. Down to the foundation of the Roman Empire, the city occupied the centre of the stage, dominating the country. During the Middle Ages, the country got the upper hand and kept it until the modern industrial era caused people to seek the towns and increased urban wealth and power in the commercial world by leaps and bounds. At the dawn of this era, wherever there was any sort of representative government, the rural communities controlled it, for the towns were small and not influential. As they grew in population and wealth, they naturally demanded a larger share in national affairs and more local autonomy. The country districts naturally were reluctant to grant either; and as they controlled the law-making power and the machinery for changing the constitution, they had their way. In England, the landed gentry and the «rotten boroughs» fought off all serious inroads into their power until the Reform Acts of 1832–5 were passed, and then a readjustment was achieved only through a revolution, although a peaceable one. On the Continent, the growing towns did not secure their fair share of influence until later. In certain countries they have not yet obtained it, and in the United States there are as extreme instances of high-handed domination of municipal affairs by country districts as existed in the 19th century anywhere. Of course, since cities grow so much more rapidly than the country, any system which apportions political power justly for the moment, must soon become obsolete. It is not this incidental injustice to which I refer, but to the deliberate refusal to give cities their fair representation in State affairs and to the constant intermeddling in matters which are purely local.

Rural Domination in the United States.— Only a few instances need be cited. In Connecticut, the State has been so gerrymandered that seven per cent of the population — rural districts — elect a majority to the House of Representatives. The 11 large manufacturing towns, containing one half of the population of the State, have 22 votes as compared with 233 votes held by the other half, the rural half of the State. No reapportionment in the House has been made since 1876, nor in the Senate since 1827. Even the moderate changes suggested by the constitutional convention of 1902, which still kept control in the hands of a few decaying, «rotten» rural districts, failed of adoption. In Rhode Island it is the same, and it is suggestive to note that these two commonwealths, among the oldest and most Puritanical of the original thirteen, are the most corrupt, depraved and debauched in political matters. This can not continue forever. The cities may not obtain the full share to which their population would entitle them, but they will compel the country to yield in the long run. The justice and equity of their demands must be recognized.

Home Rule for Cities.— The other half of the problem of the relation of city and State concerns the intrusion of the State into purely local matters, and here again history shows that this interference has been carried at times to the farthest extreme. The dispute between the king and the rural gentry was going on when the towns began to increase in wealth and population. The country had secured some degree of local autonomy, and its representatives had gotten some control over the law-making authority. They objected to granting the towns a distinct local government, or, where this was done, insisted that the central government should have constant supervision. On the Continent, the general trend was to give the cities residuary powers, that is, to permit them to do anything which was not prohibited, but through the enactment of such laws, their powers were considerably curtailed. England started with frequent central interference in local matters, usually legislative and judicial, resulting in misgovernment, corruption and decreased efficiency in central administration. The report of the Commission on Municipal Corporations for 1835, reads like a description of recent American conditions. The Continent started with greater liberty, subject to administrative supervision, which was adopted in England in 1834 and since has been extended and substituted for legislative interference, which worked so badly. Thus, insular and continental Europe have been approaching the same goal, that is, a general grant of power and form of government, with local autonomy, subject to central administrative control, such as the approval of municipal loans and certain ordinances by the Local Government Board, the audit of accounts by the same authority and the inspection of police departments by the inspectors of the Secretary of State.

State Interference in the United States.— The experience of the United States shows the same tendency; and although no State has gone so far as England, France or Prussia, a beginning has been made. A brief outline must suffice. The first city charters, whether from the English crown, the colonial authorities or the early State legislatures, defined in few words the powers, duties and form of government. Particular attention was paid to financial powers and methods of selecting officials. The authority granting the charter frequently controlled these with a strong hand. For example, annual acts authorizing New York city to assess taxes were necessary down to 1874. The mayor was appointed by the governor until 1821. Up to the middle of the century, ordinances remained in force only for a limited time (three months to three years) unless approved by the colonial or State authorities. Boston did not receive a city charter until 1822. As the cities increased in size and wealth, a more elaborate system of government was necessary, and the States undertook to regulate in detail every minor as well as every major point. These provisions needed alteration from time to time, and the only recourse was to special acts of the legislature, which grew rapidly in number and scope. The distrust of city governments, due to the corruption and inefficiency so prevalent after the middle of the century, was a contributing cause, for the restriction of functions and the removal of discretionary power was thought to be a method of remedying the prevalent evils. Even the reformers themselves fled to the State capitols for legislation in preference to fighting out the battle locally.

Special Legislation.— Wherever these conditions existed, there appeared a mass of special legislation. In the 10 years from 1880 to 1889, the Fassett Legislative Committee reported that 1,284 acts were passed by the New York State legislature affecting the government of cities; nearly one half related to the three cities now combined in Greater New York. Other States show equally bad conditions. Legislatures have constantly interfered to the extent of abolishing or creating offices, altering salaries, ordering streets to be paved, forcing the city to pay claims which were groundless, compelling the construction of unnecessary buildings, etc. The evils of State interference are important. Responsibility cannot be fixed; or if it is traced to the State legislature, this body cannot be reached, for only a small proportion of its members is elected in the city concerned. Indifference is encouraged, and city affairs are left to those who make profit from governmental prerogatives. Due consideration cannot be given to local matters, and State legislators are not sufficiently acquainted with the needs of localities, other than their own, to act intelligently. Questions are decided by log-rolling and personal favor, or a city's interests are made the football of State politics. No continuity is possible in municipal policy. The State, too, suffers, for matters of general interest often are sidetracked to let pass some little bill in which a constituent of Senator —— is personally (and often financially) interested. These injurious effects have been recognized for many years, and various remedies have been tried or suggested. The one most frequently adopted is the enactment of constitutional provisions prohibiting special legislation upon municipal matters. This method by itself has not been effective, for the courts have so interpreted "special legislation" and "municipal matters" that State interference has often continued uninterrupted. (*Vide* court decisions in Ohio prior to 1902.) The difficulty has been that each locality has peculiar needs and that no charter which goes into great detail will suit all cities; neither will it continue to be satisfactory without amendment for any length of time. Further, the State must have some sort of control over local governments; they cannot be permitted to become wholly independent; the State must supervise all matters other than those of mere local interest. But the field of local affairs has not clearly been delimited, and as long as this is the case there must be confusion and bad administration.

Administrative Control.— The best results have been attained where there is a general act of incorporation for all cities (or all cities of the same general size), or if there be a charter for each city, where it is general in character, the minor details being left to the city to determine, and to be altered locally as conditions change. There should be central *administrative* supervision instead of legislative interference, and although great progress has not been made in this direction in the United States, it has been tried sufficiently to show clearly that it would be as successful here as it has been in Europe. Such a system would improve the character of our laws by enabling legislators to give more attention to State matters, would fix responsibility for inefficiency, would arouse interest in local affairs by placing the fate of the city in its own hands, would tend to separate State from local politics and leave each to be settled upon its own merits, and would refer administrative questions to administrative departments with their staff of experts and abundant experience whereby to reach a wise decision. Just where the line is to be drawn between local and

State matters is a difficult problem, and there is a strong tendency toward the centralization of certain functions, such as education and poor relief. But so far as these matters have been transferred to the State with beneficial results, it has been where there is no important local benefit, where there is not a great diversity of opinion among localities, where there is unity as to the methods to be adopted, and where the function is general and not limited to a few localities. Until these stages are reached, the State should control, but not administer, and the extent of this control should vary with the State's interest. In no case is it pardonable for the State regularly to appoint local officers. If the function is a local function and if the expense is borne locally, the State should not interfere, except possibly to remove an officer who has been proved to be guilty of malfeasance, or to appoint when a locality refuses to perform the duties imposed by the State. The trouble has been that the municipality is an agent of the State and also the means of satisfying local needs. Hence, it is necessary to determine whether a function is local or State, or partly local and partly State, and to frame the proper system of supervision or control accordingly. This brings us to a consideration of the scope of municipal activity as recognized by practice.

Municipal Functions.— From the legal standpoint, the municipality in Great Britain and America can do only what it is authorized to do by the central government, and grants of powers are strictly construed. In Prussia and France, and quite generally upon the continent of Europe, the municipalities have residuary powers. In law the difference is not so great as one might expect from the divergence in theory, and when comparison is made between actual operations, instead of the powers which *may* be exercised, England and Germany stand side by side. In these two countries, the local governments have a greater range of activities than in any other countries in the world. Beginning with the protection of life and property, the function most generally performed by municipal governments, it is found that in all progressive countries, there are well equipped police, fire, health and judicial departments. These are not universally under the complete control of the municipal authorities, for in some cities, generally national capitals (for example, London, Paris, Berlin, and Vienna), the police force is wholly administered by the central government. In several American cities (for example, St. Louis, Baltimore, and Boston), the police authorities are appointed by the State. In practically all countries except the United States, the central governments supervise local police administration on the ground that the preservation of life and property is not of mere local interest but concerns the whole country. The same is true of the local judiciary, and to a less extent of fire and health, State supervision in the latter cases being much less extensive than in police and judicial administration.

The care of the dependent and delinquent classes is a recognized governmental function in all progressive countries, but the extent of municipal activity varies greatly. In Great Britain, the poor-law authorities are entirely independent of the town governments. Generally in the United States, especially in the smaller cities, poor-relief is granted by the county authorities, and subsidies to private institutions are made by most of the large cities. In France, Germany and the other principal countries of Europe, the cities generally have control, subject to supervision by the central governments. Everywhere municipal activity is supplemented by private and ecclesiastical charity, especially in the case of homes for dependent children and hospitals. German cities show the greatest amount of municipal action in this direction and English cities the least. The insane, owing to the comparatively small number in each locality and the economy of large asylums, are generally cared for by other than municipal authorities — State, department, or provincial authorities, as the case may be. For persons who are near the border line between dependence and self-support, there are many instances of municipal lodging-houses, either free or charging a small fee, and labor bureaus to provide employment for the unemployed. These are far more common in Europe than in the United States. A few cities have gone so far as to establish schemes for employment insurance and to rent land in small allotments to the poorer classes for truck farms.

Educational facilities are also generally under municipal control, but central supervision is usually more thorough and far-reaching than in the case of charity administration. Since the recent act in England abolishing the school boards was passed, elementary education almost everywhere is a municipal function. Secondary education is more generally left to private or church management, except in the United States where it has been municipalized, or in Germany where it belongs frequently to higher governmental authorities. As one goes higher and higher in educational work, the activity of city governments decreases. In recent years, the broadening conception of education has introduced trade schools, but there are few of these under municipal control in the United States, while in Europe they are very common, although in the smaller countries particularly, the central government often contributes to their support. Public libraries are more common in America than elsewhere. In Europe there are fewer private donations. The public treasury bears most of the burden, and there is hardly a town of importance that does not have a municipal library. On the Continent they are mostly scholars' libraries which are not frequented by the general public, as is so generally the case in the United States. Municipal museums of art and science are more common in Europe and are visited by large numbers. Theatres and opera houses are also frequently maintained by foreign cities, but of course they are not free like museums and libraries. The prices charged, however, are often very low. American cities sometimes provide concerts for the public in the parks, but there is no instance to my knowledge of a municipal theatre or opera house in the United States.

In the matter of parks, American cities, as a rule, excel all others, but Paris is the most favored city of all. Including the large parks of Versailles and Fountainebleau, there are nearly 200,000 acres within a short distance of the city, and 20,000 acres can be reached in an afternoon excursion. In foreign cities, one more frequently finds parks under private or national control than in the United States, and this is particularly true of botanical and zoological gardens, which are parks in many ways. The movement for small parks and playgrounds in densely populated districts is growing rapidly. German cities lead, but American and British cities have been more active in recent years. Municipalities have also provided facilities for football, baseball, polo, ice skating, tennis, horse racing, cricket, bicycling, bowling, target shooting, lacrosse, dancing, bull fighting and the many other forms of amusement peculiar to each country. There are also instances of recreation piers, music pavilions, school gymnasiums, race tracks, etc., administered by cities. Public baths — plunge, spray, shower, tub and sometimes Russian, Turkish and medicinal as well as river and harbor baths — have been maintained by municipalities for decades, but the great increase has come within the last 20 years. Great Britain and Germany head the list, the United States consorting with Russia, Italy, and Austria at the foot. It is to be recalled, however, that the need, great as it is, for public baths in the United States, is relatively less than in Europe where so few bath-rooms are to be found in private houses and apartments. The first municipal indoor bath in New York city was opened about two years ago.

Other instances of the democratization of city governments are to be seen in the reconstruction of slum districts, the condemnation of old rookeries, the laying out of new streets and the rebuilding of the remaining areas. Here again European cities have gone farthest. The gigantic schemes undertaken by Glasgow, Birmingham, London, and Paris show what excellent results can be accomplished, and in many instances the increased value of the land has paid a large portion (in a few cases, all) of the cost of the scheme. American cities, because of their limited powers in this regard, have not been able to carry out such large schemes or finance them so successfully. Usually a portion of the expense of laying out new streets or widening old ones is assessed upon the property benefited, and the city is recouped in part. The care of bridges and streets — paving, cleaning and repairing — is almost everywhere a municipal function, and tolls are rapidly being abolished on bridges as they disappeared from roads earlier. Sewerage systems, which have come to be considered indispensable in progressive American towns, are not so common in Europe, especially outside of the large cities, and a number of these (St. Petersburg and Moscow, for example), do not have anything that approaches a system. Conditions in the smaller cities and in the less progressive countries are most primitive. Garbage and refuse disposal is still less a municipal function, but as in the case of sewage, no progressive city of any size is considered up-to-date which does not do something either directly or indirectly. Many cities do not undertake to perform the work by direct labor, but let the contract to a private corporation. The tendency, however, is toward day labor rather than the contract system.

Industrial Functions.— The functions over which there is most debate as to the propriety of municipal action, are those which may be termed industrial functions, that is, those in which the municipality acts less as a governmental and more as a private corporation. The oldest instance is the ownership of real estate. Many of the European cities own large estates (Berlin possesses nearly 40 square miles and Vienna receives upward of $2,000,000 annually), and in some instances the income constitutes a large proportion of the total revenue — 40, 50 or 60 per cent. American cities have squandered their patrimony and now own little. New York city owned 1,500 acres on Manhattan Island as late as 1844, but soon sold it for little. Markets, cemeteries and abattoirs are usually under municipal control in Europe and not infrequently in the United States. The object is not so much profit as the protection of the health and well-being of the city. For the same reason waterworks have been operated by municipalities for generations, and the number is constantly on the increase. Municipal operation is almost universal in Germany, and exists probably in fully one half of the cities of France which have plants. In Great Britain and the United States, about two thirds of the cities over 10,000 population have municipal systems, and the supply is better and more abundant than in other countries. The municipalization of lighting plants has not been carried so far. It is advocated on economic grounds and for reasons of political expediency rather than because of the direct effect upon the health and well-being of a community. Here again Germany leads, municipal gas plants existing in four fifths of the larger towns. Great Britain is a close second; one half of the cities over 50,000 and over one third of all the towns having gasworks at all operate their own plants. In other countries private operation holds sway, although there are many instances of municipal operation. The United States has only 20 municipal plants, and in a few other instances they are jointly owned or there are also private companies.

Electric lighting is a later development than gas, and the greater extent of municipal operation reflects the strong tendency in this direction. Towns have often been able to build their own plants without buying out a private company at exorbitant prices, which was frequently necessary in the case of gas lighting, where grants were made to private companies before municipal operation was generally considered as a wise course to pursue. Municipal operation is most common in Great Britain, where only one third of the undertakings are in private hands. In Prussia about one half of the more important cities have municipal plants. Outside of Germany there are many municipal plants scattered throughout Europe, but the number of private companies is very much larger. There are many in the United States also, the number being 278 in 1902, but in nearly one third of these places there were also private companies. The proportion is larger among small towns, where electricity has only recently been introduced, than among the large cities.

The municipalization of transportation facilities, other than streets and bridges, is a still more recent movement. Harbor improvements, docks and quays are quite commonly under municipal administration, but sometimes the central government has jurisdiction. There are a few instances of municipal ferries. Street railways have also been municipalized, there being instances of municipal ownership without municipal operation and also complete municipal management. The former was the earlier form and until recently was generally adopted by British cities, but now it is giving way to public operation, and the mileage of municipal undertakings considerably exceeds that belonging to companies. In other countries municipalization has not gone so far, the number of instances being small but on the increase. Nearly every country has a few instances of public ownership or operation, except the United States, where there is only one of little importance in Grand Junction, Colo. Two American cities, New York and Boston, own rapid transit subways, and their example will probably be followed in other directions.

Another important function in central and western Europe is the municipal pawn shop (see MONT DE PIÉTE) in nearly all of the larger and many of the smaller cities, except in Great Britain, where no steps have yet been taken in this direction. In the United States, it is also left to private action, subject to regulation through laws and ordinances. Municipal savings banks are a natural outgrowth of municipal pawn shops. They are very numerous in Germany, where there are no postal savings banks, probably aggregating 1,500 in number. In France, Austria and Italy they are almost as numerous, but are more scattered in the other continental countries. Great Britain and the United States have none. A number of Russian cities have commercial banks, receiving deposits, giving credit, and in other ways doing a genuine banking business. This course has not been followed elsewhere so far as I can learn.

There are sporadic instances of other functions performed by city governments. Many cities virtually insure their own buildings by refusing to take out policies in private companies, but a few have gone further and have insured the property belonging to private individuals. Many English towns maintain laundries where the poor may bring their clothes, wash, iron and dry them for a small fee. Municipal telephones are becoming common in Europe. Tenements and single houses have been erected by many British towns for the working classes, replacing unsanitary dwellings. Certain cities manage restaurants, own interurban steam railroads, irrigation systems, stone quarries, brick yards, cold storage warehouses, oyster beds, fisheries, printing plants, lotteries, newspapers, undertaking establishments, etc.

Trend of Municipal Activity.— If one were to compare present with past municipal activity, he would find that great changes have been made. Certain functions have been lopped off and many new ones added. International affairs, for example, are now administered by the central governments; the prevention of fires is no longer an individual matter but dealt with collectively through city administrations. Upon the whole, there has been a great increase, for the new functions are far more numerous and comprehensive than those which have ceased to be municipal. The general trend is toward (1) the transfer to other authorities of functions of general as distinguished from local interest, which tend to increase as the country becomes more thickly settled; (2) the centralization of matters in the administration of which uniformity is possible and essential, and economy by consolidation important; (3) the multiplication of regulations dealing with the relations of man to man, because the individual cannot protect himself and because he should not be allowed either to impose upon the less fortunate or to remedy any injustice in his own way; (4) the increase of constructive action as distinguished from repressive measures, which is made possible by the concentration of population and has become necessary because of the conditions which great density has produced; (5) the taking over from private hands of functions which have become monopolistic and yet are of such vital concern to the whole city as to demand collective rather than individual management. In no country has there developed a fixed rule for determining whether a function should be undertaken by the municipality. None is feasible, for local conditions must decide, and these vary so greatly that it is folly to insist that municipalities shall or shall not adopt a certain course, because it apparently conflicts with some *à priori* definition of «natural rights» or a preconceived idea of the proper sphere of government.

Governmental Organization.— Having considered what is the position of the city in law and practice, its governmental organization demands attention. As in all governments, provision is made for expression of the popular will and the execution of its edicts. In practice an official may have something to do with each, and this often leads to confusion and misgovernment, for where the choice of an administrative officer is determined by his personal opinion upon matters which do not come directly under his jurisdiction, the results cannot but be disastrous. Yet, such will be the case as long as the sphere of the city is not clearly delimited and there is no adequate means for the enactment of laws which represent the will of the city, as is the case in most American cities at the present time. The first steps in the expression of the popular will are the organization of parties, the making of nominations and the election of officials. These subjects are discussed elsewhere and need not be elaborated here, except to note that the conditions of city life make necessary the adoption of methods in urban different from those in rural districts, as for example, personal registration in cities and proxy registration in the country.

The Council.— The number and character of offices to be filled are also quite different in cities. There is always a local legislative body of some sort, except in a few instances where the city is administered by higher authorities, as in Washington, D. C., where the citizens do not vote at all. These legislative bodies vary greatly in every respect. In some cities, there are two chambers; in others, only one. The consensus of opinion in Europe favors a unicameral council. There are not many truly bicameral legislatures, and where two bodies do exist, it usually will be found that one is more of a consulting body for the administrative officials than a legislature. A number of American cities have two bodies, but experience does not approve the plan. New York city has a board of estimate and apportionment and a board of aldermen, but the latter has proved so unsatisfactory that its powers have been reduced until it is only the shadow of its former self.

This tendency is almost universal in the United States, and what functions the State legislature has not assumed have frequently been transferred to the administrative departments and to the mayor, who has come to be the central figure. There are exceptions, however, and the city which most nearly resembles foreign cities with their important local legislatures is Chicago, where the council is unicameral and possessed of considerable power, even in administration as well as legislation. It is suggestive to note that Chicago has probably escaped with as little special legislation as any city and that it is organized under a general State law, which is a simple, brief, condensed statement of municipal organization and powers. Where there is a council of any importance, by whatever name it may be called, it usually is empowered, subject to such statutory limitations as exist, to regulate its own organization and procedure, to enact local ordinances, to issue franchises, to control the public property, to levy taxes, to borrow money, to apportion expenditures, and less generally to appoint and remove the chief administrative officials (council committees in England), to act as a judicial body, and ex-officio to perform many minor duties. The number of members of the council varies greatly, European bodies being generally larger than American. The London County Council has 137 members, the Budapest Council 400, the New York Board of Estimate and Apportionment only 8, Chicago 70. The term of office ranges generally from one to four years, but in certain instances as high as six and nine years (not in United States). In some countries, the whole council retires at once; in others only one half, one third or one fifth go out at the same time. Where the council committees have close oversight over administrative functions, some continuity is very essential. Of course, it often happens, especially in European countries, but not infrequently in the United States, that an efficient councillor is re-elected for several times — a custom that produces very beneficial results. The systems of representation are also various. America, England, and Germany have followed the district plan, each ward electing not more than one member at a time. In other continental countries, the council is elected on a general ticket, or each district elects a considerable number of members. Minority or proportional representation is often provided for under the general ticket plan, either by cumulative or limited voting. In Prussia, Austria, Japan and some other countries, the voters are divided into three classes, the total of the taxes paid by the voters in each class being one third of the total amount collected. Each class elects one third of the municipal council, from which it is evident that the large taxpayers have a much greater influence than the small taxpayers. The qualifications for members of the council are generally less stringent in the United States than those of voters, for an alderman need not live in the district from which he is elected, although in practice, it is seldom that he does not. In foreign countries and in a number of American cities, they are more stringent, the holding of property or the payment of a tax being a prerequisite. Obligatory unpaid service is common abroad, but some sort of a salary, although as low as $1 per session, is usually paid in American cities, and compulsory service has ceased to obtain.

The Mayor.— In the United States both legislative and administrative functions are possessed by the mayor. He very frequently, although not universally, has the veto power and sometimes presides over the council and appoints the committees. His principal powers are executive, however, and as the head of the administrative service he exercises powers that make him by far the most important person in the city government. He usually appoints and frequently may remove at will the principal officials, except the few that are elected, and consequently determines to a great extent what their policies shall be. The tendency is toward an increase of these powers; in fact, that has been the trend since the first of the 19th century. As the council has declined, the mayor has grown stronger. The method of selection, with a few exceptions, is by popular vote. Salaries range from $15,000 in New York down to small amounts in the less important cities. There are very few over $5,000 per year. Terms of office vary from one to five years, the usual length being two years in the larger cities, with one year becoming more common as the size of the city decreases. In practice, a re-election is not uncommon, but it is rarely that a man serves more than two terms.

The situation is entirely different in England. The office of mayor is one of honor and dignity but possessed of few powers. He is a member and presiding officer of the council, but has no veto power and appoints no officials except when he happens to be a member of a committee, but even then he has no more power than any other member. He is appointed by the council annually and very frequently does not succeed himself. His heavy expenses for social functions are only partially reimbursed by appropriations voted for this purpose, and hence only well-to-do men can afford to accept the honor. The one official who most nearly resembles the American mayor is the town clerk, but he is appointed by the council, receives a large salary (for England), has a permanent tenure, and does not appoint the administrative officials. Whatever of unity and harmony there is he produces, and it is his duty to keep in touch with everything. But the real administrative work of the departments is conducted by superintendents selected and directed by the committees of the council, among whom the activities of the city have been apportioned. These committees must, of course, do as commanded by the whole council, but they have great freedom and they are the administrative heads of the city, as well as part and parcel of the legislative body. It is evident that the English system contains no official who can be compared with the mayor in the United States.

In France, the *maire* more nearly resembles his American contemporary. He is a member of the council and its presiding officer, but has no veto. He prepares the provisional budget and has full power over the administration. He appoints most of the salaried officials. and may remove them. He controls the property of the city, directs public works, supervises expenditures, etc. As agent of the central government he has charge of the police and oversees the faithful execution of the national laws. He is elected, as in England, by the council, but is responsible to the central government rather than to the city. His term of office is four years.

The Prussian *bürgermeister* is not a member of the elective council, but of the board of magistrates — a sort of executive council which initiates legislation and perfects local ordinances. He does not directly appoint the other administrative officials, but he has considerable influence in this direction, being the head of the board of magistrates, which directs and controls all departments. Tenure of office is very long; the appointment is ordinarily for 12 years and sometimes for life. Burgomasters have professional training for administration, a life occupation, and are well paid considering the salaries usually given in Germany. Promotions from a small to a larger city are common.

Administrative Departments.— From this brief outline it is evident that the administrative service in France and the United States generally, is under a single head — the mayor; in Germany, under a special body — the magistrates; and in England, under the council committees. All are elected or appointed by the council and hence more or less subject to its control, except the American mayor who is elected by the people and hence wholly independent. In the United States certain of the department heads are commonly elected, such as the board of education, comptroller and treasurer (finance), assessors and sometimes others. In some cities, the council elects a considerable number; in others the appointments of the mayor must be confirmed by the council; but the trend is toward few elective officers and unrestricted power in the hands of the mayor of appointment and removal. Foreign experience points in the same direction, for the French *maire,* the English council committees and the Prussian magistrates appoint without confirmation of the council. The power of removal is not much considered abroad, for the salaried officials are experts and hold office continuously. The number of departments and the allotment of functions vary greatly from city to city. In Europe these matters are generally left to the convenience of each town; in the United States the charter often fixes them arbitrarily. The relative merits of a single head or a board of commissioners have long been discussed. The drift in the United States is toward a single head, although schools, parks, police and public works are still generally managed by boards. In England the board system is practically universal, but the council committees usually leave to the salaried and permanent head all questions save those of general policy — a very wise course. In Germany the joint committees of councilmen and magistrates are mainly advisory bodies, much more so than the committees in England. In France the single commission system is universal. Thus, the United States is the only country that clings to boards of salaried administrative officials as department heads, and here they are on the wane. Subordinate officials are invariably appointed by the heads of the departments, who have much more discretion in Europe than America where civil service rules are being widely introduced and extended. In New York city, for example, all of the city positions are included in the classified service, except the most important, those of a confidential or fiduciary character, and those requiring only manual labor. Even the last named are subject to certain examinations. In England, no such system exists in the municipal service. The spoils idea has not gotten a foothold, and it has not been necessary, therefore, to tie the hands of city officials with civil service rules. German and French cities have competitive examinations, but these are merely means to sift out the unfit, to ascertain the half dozen or dozen applicants best fitted for the position. Considerable freedom is permitted in the final choice. The public opposition to spoils is a far greater restraining force than civil service regulations.

The Municipal Problem.— Much as Americans dislike to admit it, there is no escape from the fact that European cities generally are better governed than those in the United States; there is greater efficiency, and much less dishonesty and corruption abroad. This is so well recognized that we have a distinct "municipal problem," peculiar to American cities and unknown beyond the Atlantic, having a voluminous literature of its own. In a word, the problem is: How may honesty and efficiency be secured and retained in municipal affairs? The solutions that have been suggested are many. In the first place, governmental organization has been criticized, and it has been urged that new charters should be secured. This has seemed so reasonable that charter tinkering has been the favorite occupation of the reformers in every city, but no deep and far-reaching regeneration has followed. Every known system has been tried, without achieving the desired result. Doubtless the best system helps to secure honesty and efficiency, and the highest results cannot be attained without it, but it is not the most important element. The cities with the best charters have not been the best governed. Another factor, which has been noted by many, is State interference in local matters. This has contributed to the difficulty of the situation undoubtedly, and there is the experience of England to prove that when local affairs are left to the municipality to administer and State affairs to the central government, the efficiency of each is greatly increased. But the few American cities that have been free from State interference are not so much better than the rest as to show that here is the solution of the problem. The foreign elements in our populations have also come in for a share of the blame. It is pointed out that whereas in many American cities the proportion of foreign born persons ranges from 30 to 40 per cent, in foreign cities the number of persons born outside of the country in which they reside very seldom exceeds 5 per cent and usually ranges from 2 to 4 per cent. The fact that the foreigners who throng our cities are ignorant of our institutions and unfitted for the duties of citizenship in a democracy is made the basis for an appeal for restricted suffrage and immigration as a means of purifying politics. But if this is the fundamental difficulty, why is it that those cities where the people are almost wholly of Anglo-Saxon descent, are as badly governed as any? It must be admitted, however, that the mixture of races with conflicting ideas upon all questions makes it almost impossible to bring them to agree upon the issue in an election and to get an expression of opinion upon one issue. To tell what is the result of an election under such conditions is impossible. The policy of imposing upon a city a statute which is directly contrary to the will of the people adds to the confusion and forces the voters to consider the iniquity of such measures and to disregard the question of municipal honesty and efficiency, often apparently opposing an administration which gives them both efficiency and honesty. There are still other students of municipal government who urge proportional representation, direct legislation, ballot reform, nominations by the people, the organization of *local* political parties, or restriction of suffrage to taxpayers, etc., as the principal means of reform. Of late public operation of municipal monopolies has received much attention, and when one considers the great amount of corruption due to bribery of city officials connected with the granting of franchises, he is almost forced to the conclusion that municipalization would be preferable, even with all the "graft" which might follow.

For references to the literature upon municipal affairs, see Brooks' 'Bibliography on Municipal Problems and City Conditions,' published by the Reform Club, New York. See also the following topics in this encyclopædia; CHARITIES, CIVIL SERVICE, EDUCATION, ELECTIONS, FINANCE, GARBAGE DISPOSAL, LIGHTING, MUNICIPAL OWNERSHIP, MUNICIPAL ACCOUNTING, PROPORTIONAL REPRESENTATION, SANITATION, SEWAGE DISPOSAL, AMERICAN STREET RAILWAYS, WATER SUPPLY, TENEMENT HOUSE REFORM.

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Municipal Government, Commission Plan of. The form of government that has been adopted (1911) by 148 American cities, of which nearly two-thirds lie west of the Mississippi. State-wide laws, permitting the adoption of the plan by referendum, have been enacted in Alabama, California (for cities under 10,000), Idaho, Illinois, Iowa, Kansas, Louisiana (with certain exceptions), Mississippi, Montana, Nebraska, New Jersey, New Mexico, North Dakota, North Carolina, Texas (for cities under 10,000), Utah, Washington (for cities under 20,000), and Wisconsin. Home Rule Charters providing for the commission form of government, are permissible under the laws of California, Colorado, Michigan, Minnesota, Oklahoma, Oregon, and Washington (for cities over 20,000).

The commission form of government proposes to merge the legislative functions formerly exercised by a city council and the executive powers formerly held by a mayor in a small commission, usually composed of 5 members. This commission is elected by the people of the entire city instead of by wards, and it is not only subject to recall by the citizens at any time, but the people also have the right to veto the commission's acts through the referendum and to supplement them through the initiative. The object of this new plan in government is to make party politics inoperative in municipal affairs. Candidates for the commissionership run as citizens and on policies of their own suggestion, and not as partizans on a party platform. Instead of being accountable to a political party they can be called to account only by the people who elect them.

The commission movement originated in Galveston, Texas, after the great flood of 1900 had practically wiped the city out of existence. In that day of utter chaos, when the imperative demand was for speedy and honest constructive work, the business men, realizing that the old aldermanic system was entirely unable to cope with the situation, petitioned the State government to replace it with a commission. This was done, and the good effect was immediately seen. Military rule was established, order was quickly restored, the city was rebuilt under most economical conditions, and Galveston was saved. It was in this way that the term 'commission,' as applied to municipal government, originated, and the name, for want of a more descriptive one, has been retained despite the fact that the board is no longer 'commission' in a literal sense.

The experience of the first commission in Galveston proved conclusively that a few men could get important work accomplished in half the time and at nearly one-third less cost than had been possible under the old, unwieldy form of government, and as they also succeeded in reducing both the city debt and the tax rate, the people were eager that they should remain in office. Accordingly, the commission was made an elective one, and, since that time, there have been but two changes in the personnel of that body, both occasioned by death.

The success of the new idea soon began to attract widespread attention, and, in 1906, a similar plan was adopted by Houston, Texas. Here, too, the results were all that could be desired. The old debt of $400,000 was wiped out, the tax rate was reduced from $2 to $1.70, and the credit of the city, which had been worth about 80 cents on the dollar, was restored to par. Naturally, under such circumstances, other cities in Texas were eager to adopt the system, and it was not long before Des Moines, Iowa, a city which was sadly in need of reform, began to study this phase of popular government.

The form of government now known as the 'Des Moines plan' differs considerably from that which had originated in Texas. Fundamentally it was the old 'commission plan,' but with certain important additions, including the 'referendum,' the 'initiative,' the 'recall,' and 'non-partizan primaries.' As described by writers for "The Short Ballot Organization." "By the terms of the initiative provision a petition may be presented to the commission signed by a certain number of people demanding the passage of an ordinance, and if it sees fit to refuse the request the matter must be settled by popular vote. By the referendum provision ordinances can be held up by a protest signed by a certain number of citizens and must then be rescinded by the commission or approved by popular vote. By the terms of the recall provision, the presentation of a petition signed by a certain number of voters may force any member of the commission to submit the question of his continuance in office to a new election. The non-partizan primary is simply an eliminating election. All candidates are nominated by petition (no party labels), and the leading 10 remain on the ballot for the final election."

Since the practical character of the Des Moines plan has been demonstrated, it is this form of government that has generally been adopted. Colorado Springs and a few other cities provided that the members of the commission should be elected for terms arranged to expire in rotation, and Grand Junction, Col., added the preferential ballot, whereby the voter indicates on the ballot his first, second, and third choice, thus saving the expense of a primary election. In September, 1911, the cities in 30 States under the commission form of government, were as follows:

Alabama — Birmingham, Hartfell, Montgomery, Mobile.

California — Berkeley, Modesto, Monterey, Oakland, Santa Cruz, San Luis Obispo, San Diego, Vallejo.

Colorado — Colorado Springs, Grand Junction.

Idaho — Lewiston.

Illinois — Carbondale, Clinton, Decatur, Dixon, Elgin, Hamilton City, Hillsboro, Jacksonville, Kewanee, Moline, Ottawa, Pekin, Rochelle, Rock Island, Springfield, Spring Valley, Waukegan.

Iowa — Burlington, Cedar Rapids, Davenport, Des Moines, Fort Dodge, Keokuk, Marshalltown, Sioux City.

Kansas — Anthony, Abilene, Coffeyville, Cherryville, Caldwell Council Grove, Dodge City, Emporia, Eureka, Girard, Hutchinson, Independence, Iola, Leavenworth, Kansas City, Marion, Newton, Neodesha, Parsons, Pittsburg, Pratt, Topeka, Wichita, Wellington.

Kentucky — Newport.

Louisiana — Shreveport.

Maryland — Cumberland.

Massachusetts — Gloucester, Haverhill, Lynn, Taunton.

Michigan — Harbor Beach, Port Huron, Pontiac, Wyandotte.

Mississippi — Clarksdale, Hattiesburg.

Minnesota — Faribault, Mankato.

Montana — Missoula.

New Jersey — Hawthorne, Ocean City, Passaic, Ridgewood, Trenton.

New Mexico — Roswell.

North Carolina — Greensboro, High Point, Wilmington.

North Dakota — Bismark, Mandan, Minot.

Oklahoma — Ardmore, Bartlesville, Duncan, El Reno, Enid, Guthrie, Miami, MacAlester, Muskogee, Oklahoma City, Purcell, Sapulpa, Tulsa, Wagoner.

Oregon — Baker.

South Carolina — Columbia.

South Dakota — Aberdeen, Canton, Chamberlain, Dell Rapids, Huron, Pierre, Rapid City, Sioux Falls, Vermilion, Yankton.

Tennessee — Chattanooga, Memphis.

Texas — Aransas Pass, Austin, Beaumont, Corpus Christi, Dallas, Denison, Fort Worth, Galveston, Greenville, Houston, Kennedy, Marble Falls, Marshall, Port Arthur, Palestine, Port Lavaca.

Utah — Logan, Murray, Ogden, Prove, Salt Lake City.

Washington — Spokane, Tacoma.

West Virginia — Bluefield, Huntington, Parkersburg.

Wisconsin — Eau Claire, Appleton.

Wyoming — Sheridan.

While this list of commission-governed towns and cities is complete to August, 1911, campaigns for a similar change in charter are being conducted in as many other municipalities, and the number is being constantly increased.

Municipal Housing. See Tenement House Reform.

Municipal League, National. See Municipal Accounting.

Municipal Ownership, a term which in its broadest sense might be applied to a city's owning any business, but which in general usage is referred merely to the city's ownership of such public utilities as are natural monopolies. Natural monopolies have been defined as those industries which from some inherent quality inevitably tend to become monopolies; the most important of such industries in municipalities are waterworks, lighting plants, and street-railways. The question of public ownership of these utilities is a recent one, and is the result of the rapid growth of cities, and the increasing need of having water, light and transportation, supplied with efficiency and cheapness to all citizens.

Arguments For and Against Municipal Ownership.— The reasons advanced in favor of municipal ownership are as follows: (1) An increase of the city government's functions is desirable because it makes the public affairs of more importance to the individual citizen, so that he gives them more time and attention and the government of the city does not fall into the hands of a few; also because increased importance and dignity of public services will attract better and more efficient men to the service. (2) The large monopolies which own public franchises are the principal cause of corruption in municipal government, through their attempts to gain and keep franchises, and enlarge their privileges without regard to the public welfare, and to give their functions and privileges to the municipality direct would remove a corrupting influence. (3) A city can float bonds at a lower rate of interest than a private company, and can lower the cost of supply by not seeking to make large profits on watered stock, but by merely paying expenses and interest on bonds. (4) If profit beyond this be made it can be used for lowering the general tax rate, or rates to private consumers can be reduced. (5) Without too greatly increasing cost the city may afford to pay higher wages for shorter hours to employees, and improve the standard of the condition of labor. The argument is further advanced that in the great majority of cases in which municipal ownership has been tried, the results have been very favorable, and that the cases of municipal mismanagement are more than matched by the cases of mismanagement of private industries. Among the most notable and successful examples of municipal ownership is that of the street-railways in Glasgow, Scotland, where the city assumed the operation of all street-railway lines in 1894; in that year the fares were reduced, the mileage was rapidly extended and electricity was substituted for horse-power; the financial success of the city's enterprise is thus briefly summed up in the 1902 report of the department: receipts, $3,052,000; expenses, including allowance for deterioration, $2,015,000; balance, $1,037,000, half of which is credited to the general reserve fund. Another set of statistics indicating advantage in municipal ownership, relate to the gas-plants owned by cities in the United States. In 1901 the average price of gas in private enterprises was $1.04 per 1,000 feet, in public plants $0.92 per 1,000 feet, the public plants having less than half as great an average output; in the same year the public plants made a gross profit of 29.9 cents per 1,000 feet, showing that cheaper rates did not involve failure to meet expenses. The reasons advanced against municipal ownership are as follows: (1) The political corruption of American city governments would involve inefficient officers appointed for political reasons, and consequent mismanagement. (2) If city officials are dishonest in their dealings with corporations, there is no reason to suppose they would be more honorable in their management of public industries and funds. (3) In the desire of the officials to win popular favor, rates to consumers may be reduced below what the city can really afford, and the industry thus made a public burden; or (4) a mistake on the other side may be made with the idea of reducing the general tax rate, and those who are consumers be really taxed for the benefit of those who are not. (5) Municipal management will not be progressive in testing new methods and developing new territory, being fearful of running the risk of failure and heavy expenses which such experiments involve. Opponents of municipal ownership also argue that the cheapness claimed for city operation of industries is more apparent than real; in proof of which they call attention to the fact that in many cities which have undertaken the management of municipal enterprises no provision is made in the accounts for deterioration and wear and tear of machinery and plant, or if such provision is made it is not equal to what many experts have declared sufficient, and that this item of expense will ultimately become a burden to the community. They also cite the case of the gas works of Philadelphia (the largest American city to own its gas plant) where public operation was inefficient and expensive, and a return was made to private management; and claim that this might occur in any city, especially in any large city.

Statistics of Municipal Ownership.— The first publicly owned waterworks in the United States were those of Winchester, Va., built "before 1800"; in 1890, 42.9 per cent of all waterworks in the United States were under municipal ownership; in 1902, 51 per cent were under municipal ownership; in larger cities of over 30,000 inhabitants 88 out of 135 plants were owned by the city; and the proportion of privately owned plants was largest in cities of 5,000 to 30,000 inhabitants. In 1900, of 981 cities of the United States reporting, 21 owned their gas plants (this including Philadelphia, whose plant is leased to a private company till 1927); no city larger than Philadelphia had attempted public ownership; the larger cities with public gas plants are Richmond, Va., Wheeling, W. Va., and Duluth, Wis. In Germany, however, 41 out of 54 of the larger cities own their gas plants, and the smaller cities show a still larger proportion of municipal ownership; municipal plants are also common in Holland, Sweden and Switzerland. Electric lighting plants have come somewhat more generally under municipal ownership in the United States, but few large cities have entered this field; in 1900, out of 135 cities of over 30,000 population only four owned their electric plants; but the proportion is much larger in the smaller cities and towns; of 579 cities of from 3,000 to 5,000 population, 111 reported public ownership of electric lighting plant, and 18 joint ownership. The public ownership of street-railways has made no advance in the United States; in Great Britain many large cities have gained control of their street-railways; prominent among them are Glasgow, Plymouth, Blackpool, Liverpool, Sheffield, Hull, Southampton, Huddersfield and Belfast. On the Continent municipal ownership of street-railways is rare, but increasing. Only one city of the United States owns its street-railways, Grand Junction, Col.; the cable road across Brooklyn Bridge was at one time owned and operated by the city, but was later given over to private management. New York city owns its docks, other cities have municipal boards which have supervision and control of docks, though privately owned, and Boston and a few other cities own the ferries. The question of municipal ownership of local telephone lines has also been considered, and a few municipal telephones are found in Great Britain.

It should be remembered, however, that the total progress of municipal ownership cannot be measured entirely by the proportion of cities owning important industries. Advance has been made along other lines, as for instance the increase of general and special State legislation authorizing the erection and purchase of waterworks and lighting plants, and providing for extra taxation or bond issues for establishing municipal plants; in the cities, too, there has been a growing tendency to limit the franchises in regard to time, with the idea of making municipal ownership possible in the near future. Many public men are giving serious consideration to the subject and the mayors of several important cities have been elected on a municipal ownership platform, or have openly favored it, among them may be mentioned the mayors (in 1902) of Toledo, Denver, Cleveland, and Columbus; in the election of 1901, in Saint Louis both parties had a plank favoring municipal ownership. In Chicago, an attempt to extend the franchise of street-railways for 50 years was defeated; and the question of municipal ownership of gas and electric plants, and street-railways referred to the people in the aldermanic election of 1902; the result of the vote is interesting as showing the state of public opinion in one of our largest American cities:— of the 213,859 votes cast

170,824 favored city ownership of street railways.
161,365 favored city ownership of gas plant.
157,740 favored city ownership of electric light plant.

Consult: Bemis, 'Municipal Monopolies' (1899); Carey, 'Municipal Ownership of Natural Monopolies' (1900); Fairlie, 'Municipal Administration' (1901); Foote, 'Municipal Public Service Industries;' Francisco, 'Municipalities vs. Private Corporations' (1900); Goodnow, 'Municipal Problems'; Whinery, 'Municipal Public Works'; United States Commissioner of Labor, 'Water, Gas and Electric Light Plants under Private and Municipal Ownership' (1899); and 'Municipal Affairs,' winter number for 1902.

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Munjistin, an orange coloring matter, closely allied to purpurin and to alizarin, which occurs in munjeet (East Indian madder), and has the formula $C_{14}H_5(OH)_2O_2.COOH$. It dissolves in boiling alcohol, separating again, upon cooling, in the form of brilliant golden plates. Munjistin gives an orange yellow color when used as a dye with aluminum mordants, and with iron mordants it gives a brownish purple, its colors being fairly permanent.

Munkacsy, moon'kä-chē, **Michael,** Hungarian painter: b. Munkacs, Bereg County, Hungary, 10 Oct. 1846; d. Endenich, near Bonn, 1 May 1900. His real name was Lieb, but he is known only under the assumed name derived from that of his birthplace. Beginning life as a carpenter, he met a strolling portrait painter in Gyula, who was so much struck by the artisan's interest in art that he gave him painting lessons. Munkacsy proceeded to paint portraits and genre pictures, taking his subjects from common country life. One of these early canvases, 'A Country Idyll,' was purchased by the Art Union of Pesth. He eventually put himself under the instruction of the battle-painter Franz Adam at Munich. He made rapid progress and the Hungarian government awarded him the first prize for genre paintings thrice in succession, and he was thus enabled to take up his residence at Düsseldorf and to study under Knaus and Vautier. The first great picture he painted was 'The Last Day of a Condemned Man,' exhibited in the Paris Salon in 1870. This was followed in 1871 by 'Wartime' (an episode in the Hungarian war). The succeeding year he made Paris his home and his pictures began to attract growing attention. He painted many small genres of singular power and character, such as 'Going to School'; 'The Kitchen Politician'; 'The Butter Woman'; 'The Pawn Shop' (1874); 'The Workshop' (1875); but as his strength and mastery of his art grew he rose to loftier subjects, religious and historical. In 1877 he painted 'Milton in his Blindness Dictating Paradise Lost,' to which was awarded the gold medal at the Paris Exposition. It is now in the Lenox Library, New York. Great as was the sensation created by this picture, a historic genre of remarkable coloring in gray and black and of profound insight and power of characterization, an even deeper impression was produced by his 'Christ Before Pilate' (1882), which some critics consider the greatest religious picture of its century. This vast canvas is startling in its freshness of conception, its living action, the mingled grandeur and pathos which the artist has infused into his treatment of the central figure, as well as its masterly composition and technique. It has been exhibited in all quarters of the civilized world and was bought by John Wanamaker of Philadelphia for $120,000. It was followed by his dramatic 'Christ on Calvary,' the religious intensity of which is heightened by the accurate fidelity to differing national types with which the spectators of the Crucifixion are portrayed; a piece of realism whose suggestiveness is obvious. In 1886, he produced 'The Last Moments of Mozart,' now in the collection of General Russell Alger, Detroit, Mich. The present owner paid $50,000 for this pathetic picture, in which the composer is listening to his still uncompleted requiem, sung at his bedside by his favorite singers, the night before his death. The last three years of his life this painter suffered from mental alienation and closed his days in a sanitarium.

Mun'kar. See MOHAMMEDANISM.

Munkit'trick, Richard Kendall, American author and editor: b. Manchester, England, 5 March 1853. He was educated in American academies and was one of the editors of the humorous journal 'Puck' 1881–9. Since 1901 he has been editor of 'Judge.' He has published 'Farming' (1891); 'The Moon Prince and Other Nabobs' (1893); 'New Jersey Arabian Nights' (1893); 'The Acrobatic Muse' (1896); 'The Slambangaree' (1898).

Munn, Charles Clark, American novelist: b. Southington, Conn., 1848. His boyhood was spent on a farm which he left at 17 and for 30 years was engaged as a commercial traveler. He is the author of several popular novels, including: 'Pocket Island' (1900); 'Uncle Terry: a Story of the Maine Coast' (1900); 'Rockhaven' (1902).

Munn, Orson Desaix, American publisher: b. Monson, Hampden County, Mass., 11 June 1824; d. New York 28 Feb. 1907. He was educated at the academy in Monson, was a clerk and country storekeeper there until 1846, and then bought the 'Scientific American,' which he published till his death. He was also head of Munn & Company, patent solicitors.

Muñoz, Juan Bautista, hoo-än' bä-oo-tēs'-tä mū-ñōth', Spanish historian: b. near Valencia, Spain, 1745; d. Madrid, Spain, 1799. He was graduated from the University of Valencia and was appointed in 1779 historiographer of the Indies and was instructed by the king to write a history of America. This work was published under the title 'Historia del Nuevo Mundo' in 1793 and though completed only to 1500 is highly valued. Of his manuscripts many are now in the Academy of History at Madrid but, unfortunately, many others are scattered.

Munro, mŭn-rō, **Neil,** Scottish novelist: b. Inveray, Scotland, 3 June 1864. He has published 'The Lost Pibroch: Celtic Tales and Sketches' (1896); 'John Splendid,' a Highland romance (1898); 'Gilian the Dreamer' (1899); 'Doom Castle' (1901); 'The Shoes of Fortune' (1901).

Munroe, mŭn-rō', **Charles Edward,** American chemist and expert on explosives: b. Cambridge, Mass., 24 May 1849. He was graduated at Harvard in 1871; was assistant in chemistry there for three years; professor of chemistry United States Naval Academy 1874–86; chemist to United States Naval Torpedo Station 1886–92; and since the last date professor of chemistry and dean of Columbian University, Washington, D. C. He was a special agent on chemical industries for the United States Census of 1900; is president of the American Chemical Society; received the decoration of the Order of the Medjidje from the Sultan of Turkey, 1901; has invented a smokeless powder; and is the author of various monographs on chemistry, notably of explosives.

Munroe, Charles Kirk, American writer for boys: b. Appleton, Wis., 15 Dec. 1856. He was educated at Harvard and was editor of 'Harper's Round Table' 1879–82. For many years he has made Florida his home. Among his numerous works are: 'The Flamingo Feather' (1887); 'Wakulla' (1888); 'Campmates'; 'Canoemates'; 'Raftmates'; 'Rick Dale'; 'Dorymates'; 'The White Conquerors'; 'Big Cypress'; 'At War with Portiac'; 'Life of Mrs. Stowe' (with her son); 'Copper Princess' (1898); 'Forward March' (1899); 'Under the Great Bear' (1900), etc.

Munroe, Robert, Scottish archæologist: b. Ross-shire 21 July 1835. He was educated at the University of Edinburgh and was a physician at Kilmarnock till 1886 when he turned his whole attention to archæological researches. He is a member of many learned societies at home and abroad and has published 'Ancient Scottish Lake Dwellings' (1882); 'The Lake Dwellings of Europe' (1890); 'Rambles and Studies in Bosnia, Herzegovina and Dalmatia' (1895); 'Prehistoric Problems' (1897); 'Prehistoric Scotland and its Place in European Civilization' (1899).

Mun'see Indians, an American tribe of the Delaware family, originally one of the three great divisions of that race. They were sometimes called the Wolf tribe of the Delawares. They resided along the Delaware River, and in New York, Pennsylvania, and New Jersey. During the Revolution many of the Munsees removed to Canada, where at Thames, Ontario, in 1903, there were about 100 survivors. At Green Bay, Wis., is another tribal remnant of several hundred. See DELAWARE INDIANS.

Mun'sell, Joel, American printer: b. Northfield, Mass., 14 April 1808; d. Albany, N. Y., 15 Jan. 1880. He established himself in Albany in 1827, and was publisher and editor of the 'New York State Mechanic' from 1841 to 1843. At various times he was the publisher of the 'Unionist,' the Albany *Daily State Register, Morning Express* and *Statesman*, and other journals. Munsell made a close study of the art of printing, in its history and application, and his collection of works on the subject, the largest in America, was in part purchased by the State for the New York State library. He contributed papers to the 'Transactions' of the Albany Institute, of which he was a founder, and published: 'Outlines of the History of Printing' (1839); 'Annals of Albany' (1849–59); 'Every-Day Book of History and Chronology' (1856); 'Chronology of Paper and Paper-Making' (1857, enlarged 1870); and 'Manual of the 1st Lutheran Church of Albany, 1670–1870' (1871).

Munsey, mŭn'sĭ or -zĭ, **Frank Andrew**, American publisher: b. Mercer, Maine, 21 Aug. 1854. After receiving a common school education, he began his business career in a country store, and then became manager of a telegraph office in Augusta, Maine. He went to New York in 1882 and started 'The Golden Argosy,' a juvenile weekly which he afterward changed into a monthly for adults under the style of 'The Argosy.' 'Munsey's Weekly' appeared in 1890, and after issuing this for one year he transformed it also into a monthly calling it 'Munsey's Magazine. He also founded 'The Junior Munsey' and 'The Puritan.' He might be said to be the pioneer in the publication of cheap illustrated publications. He also controls the New York *Daily News*, the Boston *Journal* and the Washington *Times*. He is a popular member of many clubs in New York city and elsewhere, and is the author of several books for boys: 'Afloat in a Great City' (1887); 'The Boy Broker' (1888); 'A Tragedy of Errors' (1889); 'Under Fire' (1890); and 'Derringforth' (1894).

Mun'son, James Eugene, American inventor: b. Paris, N. Y., 12 May 1825. He was educated at Amherst College and in 1857 removed to New York, where he was court stenographer for 30 years. He invented the "Munson System" of shorthand, a machine for operating the typewriter by telegraph, and a type-setting machine. He published: 'The Complete Phonographer' (1866); 'Dictionary of Practical Phonography' (1875); 'A Shorter Course in Munson Phonography' (1900); etc.

Mun'ster, Ireland, the southwest and largest of the four provinces of that country, bounded on the north by Connaught, on the east by Leinster, and on the west and south by the Atlantic Ocean. It has an area of 9,521 square miles and is divided into the counties of Clare, Cork, Kerry, Limerick, Tipperary, and Waterford.

Münster, mün'stĕr, Prussia, the capital of Westphalia, a town and episcopal see, in a plain on the Aa, at the junction of several railways and on the Dortmund-Ems canal, 78 miles northeast of Cologne. The site of its mediæval ramparts has been converted into promenades. The principal edifices are the cathedral, the church of St. Lambert, the Rathaus, exchange, museum, theatre, the Pauline Library, several educational, benevolent, and charitable institutions, etc. The manufactures include woolen, linen, and cotton goods, leather, sugar, starch, etc. Münster originated in a monastery around which a settlement arose in the 12th century; it was long governed by martial bishops. The most notable event in its long history occurred in 1532–5 when the city fell into the hands of the Anabaptists (q.v.). Pop. about 65,000.

Münsterberg, mün'ster-bĕrg, **Hugo**, German-American psychologist: b. Dantzic, Germany, 1 June 1863. He graduated at the Dantzic Gymnasium in 1882, and pursued post-graduate studies in physiology, philosophy, natural sciences and medicine until 1887. He received the degree of Ph.D. at Leipsic in 1885 and that of M.D. at Heidelberg in 1887. After this he was instructor and assistant professor of psychology in the University of Freiburg at Baden, Germany. In 1892 he came to America and accepted the professorship of experimental psychology at Harvard University, Cambridge, Mass., where he has remained ever since. His studies in psychology have chiefly been devoted to its physiological aspects. He is a member of the Psychological Association and was elected its president in 1898; also a member of the American Academy of Arts and Sciences. Most of his works are in the German language: 'Die Willenshandlung' (1888); 'Gedankenübertragung' (1889); 'Der Ursprung der Sittlichkeit' (1889); 'Beiträge zur Experimentellen Psychologie' (1889–93); 'Aufgaben und Methoden der Psychologie' (1891); 'Psychology and

Life' (1899); 'Grundzüge der Psychologie' (1900); and 'American Traits' (1902). He has also been a large contributor of psychological and philosophical articles to the 'Psychological Review' and many other magazines and periodicals.

Munt'jac, a small East Indian deer representing the genus *Cervulus,* which resembles the musk-deer in many points, especially in having long sharp upper canine teeth, or tusks, which are effective weapons. These little deer, only 20 to 22 inches in height, inhabit hilly jungles, and have lyrate, single-pronged antlers, mounted upon remarkably tall pedicels. Several species are known, of which the most familiar is the Kakar or barking-deer (*C. muntjac*) of Indian sportsmen, whose loud resonant cries may be heard at a surprising distance, and which is a favorite not only because it exercises skill in its pursuit, but gives excellent venison. Consult Kinloch, 'Large Game Shooting' (1885).

Münzer, münt'sĕr, **Thomas,** German religious fanatic: b. Stolberg about 1490; d. Frankenhausen 15 May 1525. He preached at Zwickau in 1520, and at Prague in 1521, promulgated his doctrines at Allstedt in Thuringia in 1523, and excited the people to revolt against the authorities. In Mühlhausen (1524) he gained the unqualified support of the populace, deposed the city council and appointed a new one, suffered the monasteries and houses of the wealthy to be sacked, and proclaimed a community of goods. He was now joined by another fanatic named Pfeifer, with his troop of rapacious followers, and this circumstance with the news that 40,000 peasants had assembled in Franconia, and plundered and burned 150 castles of the nobles and 23 monasteries, inflamed his zeal, and he joined in what was termed the «Peasants' War,» intending to exterminate «the godless princes and priests.» Leaving Pfeifer governor in Mühlhausen, he proceeded to Frankenhausen, and rekindled the ardor of the townspeople. The dukes of Saxony, Philip, and Brunswick, and other rulers sent a force against the insurgents; Münzer was totally defeated after an obstinate struggle, was taken and executed. See PEASANTS' WAR.

Munzinger, moont'sĭng-ĕr, **Werner,** Swiss explorer: b. Olten, Switzerland, 4 April 1832; d. Africa 14 Nov. 1875. He engaged in mercantile life and later became British and then French consul at Massowah in Egyptian Abyssinia. He explored a large part of northeastern Africa and wrote much concerning his travels. Among his works are: 'Ostafrikanische Studien' (1864); 'Vocabulaire de la Langue Tigré' (1865); etc.

Muradabad, moo-rä-dä-băd'. See MORADABAD, INDIA.

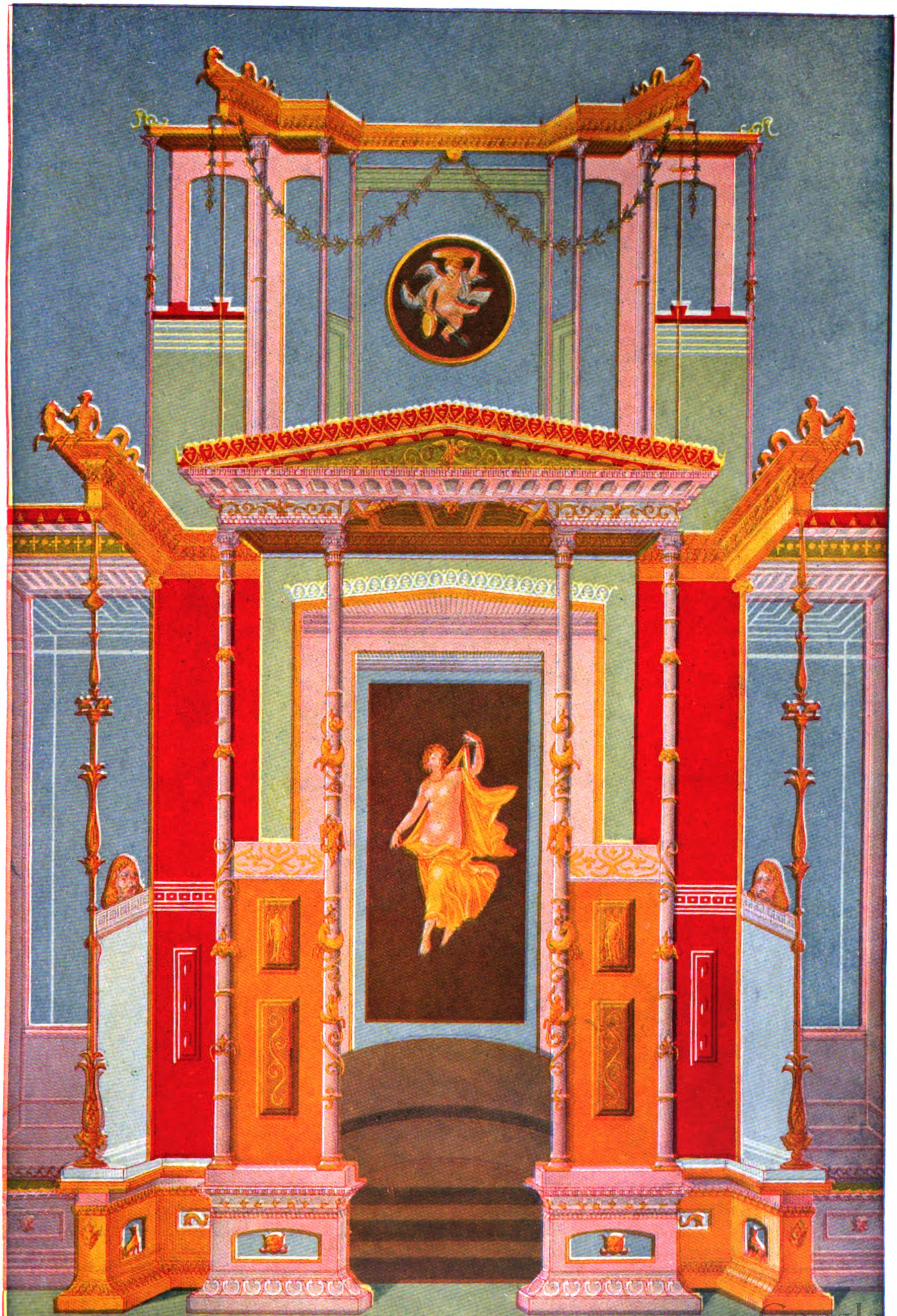
Muræ'na, an eel or moray of the family *Murænidæ.* (See MORAY.) There can be little doubt that the *muræna* of the Roman feasts often translated «lamprey,» was one of the true eels. It was held in the highest esteem. Pliny tells of the enormous sums of money and the great care which were spent on the cultivation of the muræna. The artificial fish-pond of Lucullus was said to have been sold for about $200,000; and one Hirrius is said to have furnished Cæsar with 6,000 murænas alone for a regal entertainment given to the people. We are also told that these fishes were kept as pets by both sexes of the Roman nobility. See MULLET.

Mural Circle, in astronomy, an instrument formerly employed in observatories to measure the zenith distances of stars. The mural circle is now superseded by the *Meridian Circle.*

Mural Decoration. Mural decoration includes, besides wall painting, the facing of the walls with marble, arranged in patterns or carved in relief, as well as the use of tiles, mosaic, decorative plaster, sgraffito, fresco, and stenciling; also of such wall coverings as tapestry, painted hangings, printed papers and cloths. The history of mural decoration takes us back to the earliest times. In early Egypt the wall surfaces were covered with conventional figures, or vertical stripes and zigzags, cut in slightly below the surface. These early patterns, as well as the human figures and hieroglyphics of later and more elaborate work, were carefully colored. Painting of patterns and human subjects on the uncarved flat surface was also used: but always in flat color, without gradation, and therefore wholly conventional in character. In Babylonia and Assyria, wall surfaces were frequently covered with alabaster slabs, carved in low relief, and with enameled and colored bricks. In Greece, the wall surfaces which formed the background of reliefs were frequently highly colored and much of the detail was brought out in contrasting tones. The Etruscans had a system of wall painting, and their tombs dating back to the 8th century still show examples of their work, but is of but little comparative merit. The principal specimens remaining of Roman wall-painting are to be found in Pompeii. There is also a good example in the so-called House of Livia, on the Palatine Hill in Rome. The early Christians, who held their religious services in the catacombs, were accustomed, from the 1st to the 9th century, to decorate the walls, and we have wall pictures of the 4th century still remaining. Byzantine architecture is especially noted for its mosaic wall decoration, as found, for example, in Santa Sophia, Constantinople, and Saint Mark's, Venice. Romanesque examples are found in the Cathedral of Monreale, Sicily, the church of San Clemente, Rome, and San Miniato, near Florence. Gothic church architecture depends more for its decoration on its stained glass than upon wall painting or mosaic, although in Italian Gothic art examples of colored mural decoration are numerous. Under the influence of the Renaissance wall paintings were numerous and beautiful, especially in Florence and Sienna; and soon the palaces of Rome surpassed even those, the work being generally in fresco. Later work, especially after the introduction of oil painting, grew to have somewhat of the nature of easel pictures. There are good examples of this later Renaissance style in the Doges' palace in Venice, and in the Italian churches, and it reappears in the modern work of the Pantheon and the Hotel de Ville, Paris. In America, the wall paintings at the Boston public library and the Library of Congress, besides some recent work in New York city, are worthy of attention.

The names of the painters who have left us wall decorations as products of their work give us a key to the progress of mural painting.

POMPEII



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From the time when Giotto gave life to a dead art to the time of Puvis de Chavannes is a period of 500 years. Following Giotto came the Florentines, such as Orcagna, Masaccio, Benozzo, Gozzoli, Lippi, and Ghirlandajo, and the Umbrians and Siennese, such as Lorenzetti, Signorelli, Perugino, Pinturicchio, and Raphael. This great period of mural painting culminates in the work of Michelangelo in the Sistine Chapel. Later came the Venetians Titian, Paul Veronese and Tintoretto; but their work was generally on canvas, stretched on frames. From the period of the Renaissance to the last part of the 19th century there was little notable mural decoration, but since then there have come Hippolyte, Flandrin, Puvis de Chavannes, and Baudry, in France; La Farge, Abbey, Blashfield, Walker, Vedder, Mowbray, Cox, Simmons, Blum, Reid, Turner, and Sargent, in America, have been carrying out wall decorations in a manner that speaks encouragingly for the 20th century. Among the more celebrated and important pieces of mural painting are La Farge's 'Ascension of Christ' in the church of the Ascension, New York, and his decoration of Trinity Church in Boston; Simmons' paintings in the criminal court building, New York; Blashfield's in the Congressional Library at Washington; and the magnificent pictures by Sargent in Sargent Hall, Boston public library.

Mosaic.— For external pictorial decoration mosaic is the best medium. It is made generally of small glass tesseræ, which can be colored freely, and even gilded by the insertion of leaf gold, producing permanent metallic lustre in backgrounds and ornaments. Mosaic may be used on a large scale with stone, brick, or terracotta, and either polished or left with a dull finish. Mosaics may be of marble or of glazed tiles; but the term when used without qualification refers to work done with very small tesseræ as stated above.

Fresco.— The name «fresco» means painted in water-color upon fresh plaster, and this was the great medium of the Renaissance men. Encaustic means that heat is applied in fixing the color. Encaustic was used especially by the Greeks and Romans, but little is known of the exact process. The only example of the Pompeian decoration that has been brought to America is that in the Metropolitan Art Museum in New York, taken from the Boscoreale Villa, near Pompeii, buried in the eruption of Mount Vesuvius in 79 A.D. These were unearthed in 1901, and the entire plaster walls of one room and sections from other parts of the villa were brought late in the year 1903.

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FRANK A. BOURNE,
Architect, Boston, Mass.

Murat, Joachim, zhō-ä-kēm mü-rä, French marshal and some-time king of Italy: b. Bastide, Lot, France, 25 March 1771; d. Pizzo, Calabria, Italy, 13 Oct. 1815. He was the son of a prosperous innkeeper of La-Bastide-Fortunière, near Cahors, France, and had a remarkable career. While studying for the priesthood at Toulouse he enlisted in a cavalry regiment but was soon dismissed for insubordination. He served in the constitutional guard of Louis XVI.; then entered the 12th regiment of mounted chasseurs and rose by his zealous Jacobinism to the rank of lieutenant-colonel. He attached himself to Napoleon in 1795, and followed him to Italy and to Egypt. In these campaigns he frequently distinguished himself, and in 1799 Napoleon appointed him general of division. He clung close to the great leader and returned to France with him from the disastrous Egyptian campaign. At a time when everything depended on prompt action he rendered Napoleon most valuable service by dispersing the Council of Five Hundred at Saint Cloud, on the memorable 18th Brumaire. In gratitude and as a reward Napoleon entrusted him with the command of the Consular Guard, and shortly after (20 Jan. 1800) gave him his youngest sister, Caroline, in marriage.

Murat had command of the cavalry at the battle of Marengo and expelled the Neapolitans from the Papal States. In 1803 he was made a member of the *Corps Legislatif,* and in 1804 was the governor of Paris. On the establishment of the Empire Murat became one of the popular idols, and was showered with honors. He was made marshal of the empire, grand-admiral, and prince of the imperial house. His services in the campaign of 1805 against Austria, in which he entered Vienna at the head of the army, were rewarded in 1806 with the grand-duchy of Cleves and Berg. He participated in the battles of Austerlitz, Jena, Eylau and Friedland. In the war of 1806 with Prussia, and of 1807 with Russia, he commanded the cavalry, and in 1808 he commanded the French army which occupied Madrid, and quelled the insurrection there in May. He expected to receive the crown of Spain, as Charles IV. had invested him with royal authority; but Napoleon, who destined Spain for his brother Joseph, placed him on the throne of Naples 15 July 1808 He then took the title of «Joachim Napoleon.» Ferdinand IV. (q.v.), however, continued to rule in Sicily under English protection. Murat proved a beneficent king and instituted some reforms, but he was, after all, but the tool of Napoleon. He shared the hardships and reverses in the disastrous Russian campaign of 1812, and returned to Naples discouraged and discontented. In 1813 he again fought for Napoleon, whose cause he deserted after the battle of Leipsic. He entered into a treaty with England and Austria in 1814 which guaranteed him his throne on condition that he would join the coalition against Napoleon. He took up arms again in 1815 for Napoleon; but being defeated by Generals Neipperg and Bianchi he was forced to leave Italy, and took refuge in Toulon. After the overthrow of Napoleon he escaped to Corsica, and set sail for the Neapolitan territory with a view to recover his kingdom. He foolhardily landed at Pizzo on 8 October, but was immediately captured, tried by court-martial, condemned and shot.

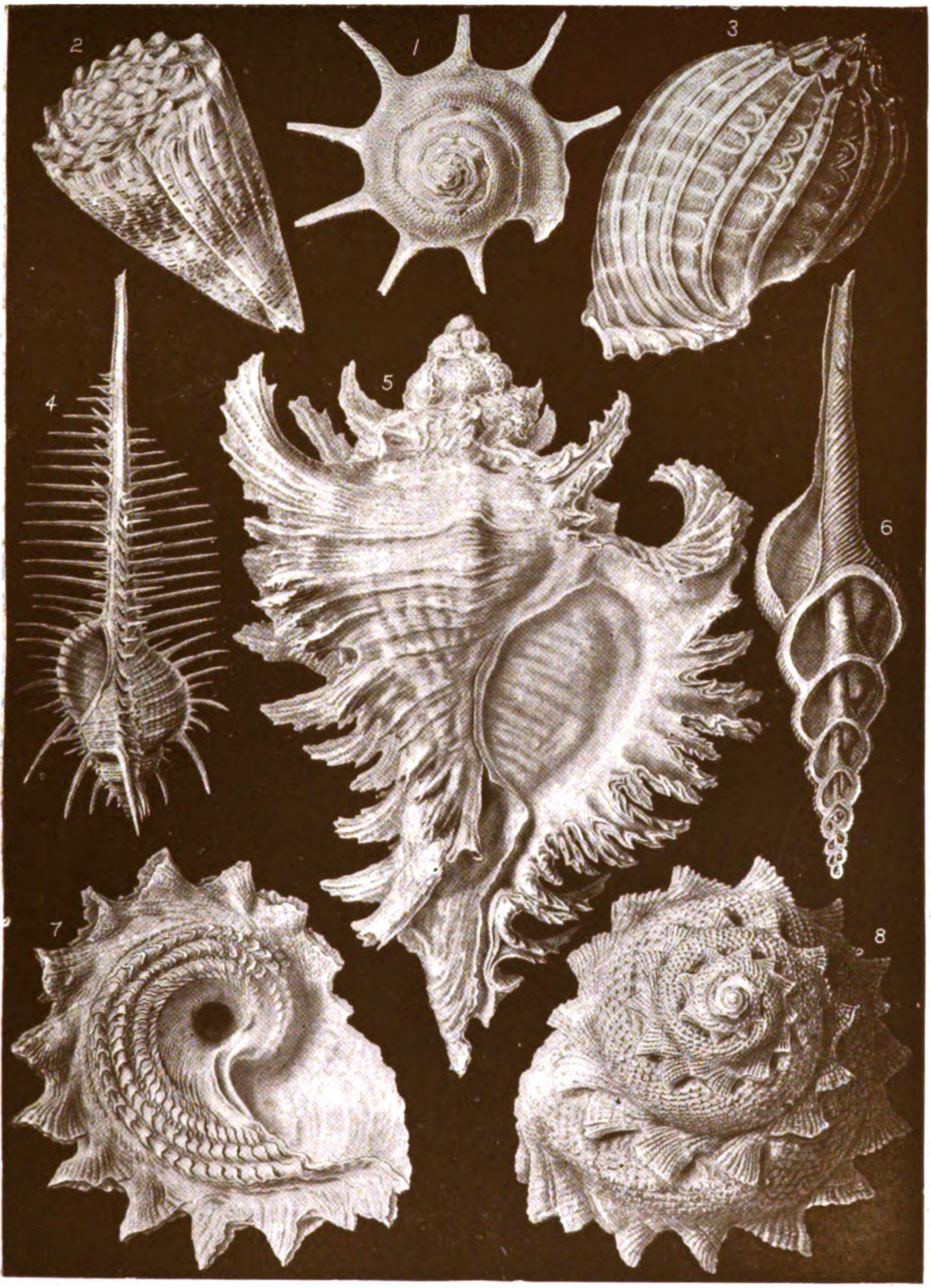
Murat, Napoleon Achille, French American author: b. Paris 21 Jan. 1801; d. Wasceissa, Leon County, Fla., 15 April 1847. He was the son of Joachim Murat, king of Naples, and before his father's overthrow bore the title of Prince of the Two Sicilies. When his father lost the throne he sought refuge in Austria, where he received his education. In 1821 he came to the United States, and after an extended tour through the country bought a large estate and settled near Tallahassee, Fla., where he devoted himself to farming and literary work; he also gave largely to and was active in philanthropic enterprises. He became a United States citizen, and in 1824 was made alderman of the city of Tallahassee, in 1825 mayor, and in 1826 postmaster. He accompanied Lafayette during most of his visit to the United States, and at that time was introduced to Catharina Dudley, a grandniece of Washington, whom he afterward married. He refused many offers of political advancement, and lived quietly on his estate. In 1828 he published in the Paris 'Revue Trimestrielle' a series of letters on political parties in the United States, which were later published as 'Lettres d'un Citoyen des Etats Unis à ses Amis d'Europe'; in 1838 he published 'Esquisses morales et politiques sur les Etats Unis d'Amérique'; and 'Exposition des Principes du Gouvernement républicain tel qu'il a été perfectionné en Amérique' (Exposition of the Principles of Republican Government as Perfected in America). This latter work was very popular among those of republican sympathies in Europe, was translated into several different languages, and passed through over 50 editions.

Murat, Napoléon Lucien Charles, nā-pō-lā-ôṅ lü-sē-ôṅ shärl, Prince of Ponte Corvo, French politician, second son of Joachim Murat: b. Milan 16 May 1803; d. Paris 10 April 1878. He left Italy for Austria with his mother in 1815; started for the United States in 1824, but was shipwrecked on the Spanish coast, and held prisoner for a time; arrived in Boston in 1825; and in 1827 married an heiress of Bordentown, N. J., Georgina Fraser, who was soon afterward reduced to school teaching for her living. Murat returned to Paris in 1848, sat in the Constitutional Assembly and in the Legislative Assembly (1849), was minister to Turin (1849–50), had his debts paid and received a pension of $30,000 a year under Napoleon III., and in 1859–60 made a feeble claim to the crown of Naples, but received no support from France. His vote in the Senate, where he sat from 1852 to 1870, for the temporal power of the Pope, alienated from him the French Freemasons, whose grand-master he had formerly been. He retired to private life after the revolution of 4 Sept. 1870.

Muravieff, moo-rä-vē-ĕf', Russian noble family, originally settled in the grand-duchy of Moscow, but in 1488 receiving from Ivan Vassilievitch holdings in Novgorod. Its chief members are: Nikolai Jerofeyevitch, d. Montpellier 1770, governor of Livonia, and author of the first Russian algebra. Mikhail Nikititch, b. Smolensk 25 Oct. 1757; d. Saint Petersburg 29 July 1807; was chosen tutor to the grand-dukes Alexander and Konstantin in 1785, rector of the University of Moscow (1796), and secretary of state to the ministry of public instruction (1801); and wrote a manual of ethics, which is classic in Russia (1810, 1815). Nikolai Nikolaievitch, son of the governor of Livonia: b. Riga 1768; d. Moscow 1 Sept. 1840; was educated at Strasburg; entered the navy 1788; was captured in 1790; was transferred to the army in 1796; and from 1797 to 1823, with the exception of service against Napoleon in 1812–14, he was at the head of a private military school near Moscow, which was bought by the government in 1816. His son, Alexander Nikolaievitch, b. 1792; d. Moscow 1864; was sent to Siberia for his part in the conspiracy of 1825; was pardoned; served in the Crimean war; and as governor of Nijni Novgorod did much for the abolition of serfdom. Another son, Nikolai Nikolaievitch, b. Saint Petersburg 1793; d. there 4 Nov. 1866; entered the army at 17; served in the Caucasus; was sent to Khiva 1819; distinguished himself in the war with Turkey, 1828–9, and in the Polish campaign, 1831; in 1832 treated with Mehemet Ali; was disgraced and retired in 1838, but reinstated in 1848; and in 1855 commanded the army in the Caucasus. He wrote a valuable book about his travels in Khiva (1822), and on the campaign in the Caucasus in 1855 (1876). His brother, Mikhail Nikolaievitch, b. 1795; d. Syrez, near Luga, 10 Sept. 1866; became major general in 1830; was military governor of Grodno; was a member of the Council of State, 1850–62; opposed the emancipation of the serfs; used such cruelty in putting down a student rising in 1861 that he was forced to resign; but in 1863 was sent to Wilna as governor-general, and won from the Poles the name of the Hanger or Executioner by his pitiless severity; and in 1866 was president of the commission which examined Karakasoff, who attempted to assassinate Alexander II. His memoirs were published by his grandson, Mikhail Nikolaievitch, b. 7 April 1845; d. 8 June 1900; ambassador to Berlin (1885), to Copenhagen (1893); and from 1897 to his death foreign minister. He did much to solve the Cretan question, published the invitation to the Hague Peace Conference (1898), and forwarded Russia's interests in China. Another Nikolai Nikolaievitch, Count Muravieff Amursky, b. Saint Petersburg 1809; d. Paris 19 Nov. 1881; fought in the war with Turkey, 1828–9; became governor-general of Eastern Siberia in 1847; in 1858 concluded the treaty of Aigun with China, by which Amur was ceded to Russia, and thus won the title Amursky; and in 1859 arranged a treaty with Japan at Yeddo. The last 20 years of his life were spent in Paris. The Muravieff-Apostol branch of the family, so called because of its intermarriage with that of Apostol, a Cossack hetman, is most prominently represented by Ivan (1769–1851), who translated Aristophanes, Horace, Sheridan, etc., into Russian; and by his son Sergei (1796–1826), who took part in the conspiracy of 1825 and was executed in Saint Petersburg.

Murchison, mėr'kĭ-sŏn, Sir **Roderick Impey,** Scottish geologist: b. Tarradale, Ross, Scotland, 19 Feb. 1792; d. London 22 Oct. 1871. He was educated at the military college in Great Marlow and at the University of Edinburgh;

MUREX.



1. Calcar triumphans. 2. Conus imperalis. 3. Harpa ventricosa. 4. Murex tenuispinus. 5. Murex inflatus. 6. Fusus longicauda. 7. 8. Australium imperiale.

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entered the army in 1807 and served under Wellington in the Peninsular campaign, but retired from the army with the rank of captain of dragoons in 1815. He then took up the study of science and spent years in scientific investigations, particularly in that of geology. In 1825 he became a member of the Geological Society of London, of which he was president in 1831–2 and in 1842–3. His investigations extended through France, England and Wales and he reclassified the Palæozoic rocks giving to his new system the name Silurian in 1835. In 1841 he was commissioned by Emperor Nicholas to make a geological survey of Russia and was engaged in that work until 1844 making discoveries which enabled him to present to the scientific world the Permian system. He was one of the founders of the British Association for the Advancement of Science and presided over it in 1846. He was several times elected president of the Royal Geographical Society and from 1862 until his death was continuously re-elected. In 1855 he was appointed director of the British Geological Survey. He published: 'Geology of Cheltenham' (1834); 'The Silurian System' (1839); 'Geology of Russia in Europe and in the Ural Mountains' (1845); 'Geological Atlas of Europe' (1856); etc. See Geikie, 'Memoir of Sir Frederick Murchison' (1875).

Murchisonite, a flesh-red variety of the mineral orthoclase, which exhibits golden-yellow reflections when viewed from certain directions. It occurs at Dawlish and Exeter, England, and is named for its discoverer, Sir Roderick I. Murchison.

Murcia, mėr'shĭ-a̤ (Sp. moor'thē-ä), Spain, the capital of the ancient kingdom and modern province of same name, 30 miles northwest of Cartagena, on the Segura, which divides the town into two unequal portions, connected by a handsome bridge. The city is surrounded by a brick wall, and is entered by three principal gates. The streets are generally broad, straight, and well paved. Among the public buildings the most important is the cathedral, its principal façade a fine combination of Corinthian and composite architecture. It was begun in 1353. In the plaza stands the capacious episcopal palace, built in 1752, one of the finest edifices of its class in Spain; and in close proximity to it the colleges of St. Fulgentius and St. Isidore, which form one range of building. The bishop takes his title from Cartagena, from which town the see was transferred. The other public edifices and institutions consist of the college of St. Leander, which is an academy of music connected with the cathedral; the hospital of St. John, with which is connected a hospital for convalescents; a house of refuge, a foundling hospital, the town-house, an institute for advanced education, a school of design, an ecclesiastical seminary, several nunneries, a bull-ring, and a good botanical garden. There are manufactures of coarse cloths and baize of different colors; of silk-stuffs, especially taffeta and plush; linens, hats, gloves, saltpeter; also silk spinning-mills, dye-works, potteries, tanneries, soap-works, and about thirty flour-mills. Considerable commerce is carried on in silks and other manufactures, as well as in grain, etc. Pop. about 115,000.

Murder. See Homicide.

Murdoch, mėr'dŏk, **James Edward,** American actor: b. Philadelphia, Pa., 25 June 1811; d. Cincinnati, Ohio, 19 May 1893. He made his début as an actor in Philadelphia in 1829, playing Frederick in 'The Lover's Vow,' and in 1838 appeared in New York as Benedick in 'Much Ado About Nothing.' He played Pythias to Edwin Forrest's Damon and in 1842 retired from the stage to study. He reappeared in New York in 1845 as Hamlet and for 15 years played with great success in the United States and England. During the Civil War he devoted himself to caring for the wounded soldiers and in giving entertainments for their benefit. His best roles were Hamlet, Mercutio, Benedick, and Claude Melnotte, in which he had few equals. He published with William Russell: 'Orthophony' (1845); and 'The Stage' (1885).

Murdock, Harold, American banker: b. Boston, Mass., 1862. He was educated at the Boston Latin School, entered the banking business and is president of the National Exchange Bank of Boston. He wrote: 'The Reconstruction of Europe: a Sketch of the Diplomatic and Military History of Continental Europe from the Rise to the Fall of the Second Empire' (1889).

Murdock, William, Scottish inventor: b. Bellow Mill, near Old Cumnock, 21 Aug. 1754; d. Sycamore Hill, near Soho, 15 Nov. 1839. He went in 1777 to Birmingham, where he obtained employment in the famous engineering establishment of Boulton & Watt, at Soho, near that town. A demand for Watt's pumping-engines came from the Cornish mines, and Murdock was soon sent thither to superintend the erection and fitting of these engines. In 1800 he was made manager of the works of Boulton & Watt, being afterward admitted as a partner. He retired in 1830. His invention of coal-gas lighting remains his most conspicuous achievement. He began in 1792 his experiments regarding the illuminating properties of gases produced by distilling wood, peat, and coal. In 1800 he had an experimental gas apparatus in operation at Soho, and in 1803 the Boulton and Watt foundry was regularly lighted by that means. In February 1808, Murdock read before the Royal Society a paper detailing his investigations. Gas-lighting fell into the hands of promoters, and in 1809 Murdock was compelled to publish a vindication of his claims in 'Letter to a Member of Parliament.' It has been asserted that he invented the steam locomotive, but the three engines he made came to nothing.

Mu'rex, a genus of gasteropod mollusks typical of the family *Muricidæ*, resembling the whelk; shell spiral, rough, with three or more ranges of spines simple or branched. Murices are remarkable for the beauty and variety of their spines. They were in high esteem from the earliest ages on account of the purple dye that some of them yielded. See Purple Shell.

Mu'rexide, in chemistry, the hydrogen-ammonium salt of a hypothetical acid called "purpuric acid," the acid itself not being known in the free state. Murexide has the chemical formula $C_8H_4N_5O_6(NH_4)$, and about 1855 it was largely used as a dye. The colors that it gives are fast so far as light is concerned, and are quite brilliant; but they tarnish quickly when exposed to sulphur dioxid gas, and hence are more or less fugitive in houses where coal gas is burned. As a dye, murexide has now been replaced by the coal-tar colors (q.v.). It may be prepared by evaporating a mixture of uric acid and nitric acid to dryness, and moistening the reddish residue with ammonia. The beautiful purple red of murexide is at once developed. (This reaction is used as a test for uric acid, in urinary analysis.) Murexide dissolves in water to a beautiful purple solution, the color changing to blue upon the addition of potash. The commercial supply of murexide, when it was used as a dye, was prepared from uric acid; the uric acid required being obtained from guano, in which it exists in considerable quantities. A dye similar to murexide, and perhaps identical with it, was obtained by the ancients from a gland of the murex, or «purple-fish»; whence the name «murexide.»

Murfree, mėr'frē, **Mary Noailles** («CHARLES EGBERT CRADDOCK»), American novelist: b. Murfreesboro, Tenn., 24 Jan. 1850. Her early years were spent in Murfreesboro to which after some years in Saint Louis she returned in 1890, and her careful studies of life in the mountains of Tennessee, where her summers have usually been passed, are reflected in nearly all of her books. Her earliest short story appeared in the ‘Atlantic Monthly’ in 1878, and was followed by others over the signature «Charles Egbert Craddock.» Until her identity was revealed in 1885 they were supposed to be the work of a masculine writer. She has published: ‘In the Tennessee Mountains’ (1884); ‘Where the Battle was Fought’ (1884); ‘The Prophet of the Great Smoky Mountains’ (1885); ‘Down the Ravine’ (1885); ‘In the Clouds’ (1886); ‘The Story of Keedon Bluffs’ (1887); ‘The Despot of Broomsedge Cove’ (1888); ‘His Vanished Star’ (1894); ‘The Phantoms of the Footbridge’ (1895); ‘The Mystery of Witchface Mountain’ (1895); ‘The Juggler’ (1897); ‘The Young Mountaineers’ (1897); ‘The Bushwhackers’ (1899); ‘The Story of Old Fort Loudon’ (1899); ‘The Champion’ (1902); ‘A Sceptre of Power’ (1903).

Murfreesboro, mėr'frēz-bŭr-ō, Tenn., city, county-seat of Rutherford County; on the Nashville, C. & St. L. railroad; about 33 miles southeast of Nashville. The first settlement was made in 1811 and in 1817 it was incorporated. It was the capital of the State from 1819 to 1826. It is in an agricultural section in which cotton is one of the principal products. The city has a number of manufacturing establishments, chief of which are flour and lumber mills, tanneries, cotton gins, cotton compresses, machine-shops, red cedar ware factories, and carriage factories. On the site of the Stone River battlefield, near the city, is a National cemetery which contains the graves of 6,150 soldiers, 2,333 of unknown dead. (See STONE RIVER, BATTLE OF.) It is the birthplace of the author, Mary Noailles Murfree (q.v.). Pop. (1910) 4,679.

Murger, Henri, ŏṅ-rē mür-zhär, French poet and novelist: b. Paris 24 March 1822; d. there 28 Jan. 1861. He entered a lawyer's office, but left it, and was for a time secretary to the Russian Count Tolstoi. Of his career in 1838–48 almost nothing is known. He was a member of an informal club or clique of unconventional and impecunious young artists and authors, which was named «Bohemia,» and the associates «Bohemians»—a name famous in general literary history. He contributed a great mass of «copy» to numerous periodicals, and at last made a reputation by his ‘Scènes de la Vie de Bohème’ in which he appears as Rodolphe (1848). He then found sufficient to do, wrote dramas for the Luxembourg Theatre, and articles for the ‘Revue des Deux Mondes.’ Other works are: ‘Scènes de la Vie de Jeunesse’ (1851); ‘Le Pays Latin’ (1852); ‘Le Dernier Rendezvous’ (1852); and ‘Les Buveurs d'Eau’ (1854). Many of his lyrics are very beautiful, and his prose works, especially his masterpiece, are characterized by rare humor and pathos. Consult the appreciation in Saintsbury's ‘Essays on French Novelists’ (1891).

Murghab, moor-gäb', a river of Central Asia, which rises on the northern frontier of Afghanistan, in the Paropamisus Mountains, and after a northwestward course of nearly 400 miles, loses itself in the desert sands surrounding the oasis of Merv.

Mu'riacite. Same as ANHYDRITE (q.v.).

Muriat'ic Acid. See HYDROCHLORIC ACID.

Murichi, or **Morichi,** a South American palm of the genus *Mauritia* (*M. flexuosa*), also known as ita-palm; it is nearly related to the *buriti* (q.v.) or wine-palm. These palms reach a height of 100 to 150 feet, and grow along the Orinoco River, forming great forests near its mouth. It furnishes to the Indians of that region almost everything; and during much of the year, when the lowlands adjacent to the river are flooded, they dwell among its branches, like monkeys, for want of dry land upon which to rest or travel. «At the time of the inundations,» says Humboldt, «the tufts of the fan-leaved murichi present the appearance of a forest issuing from the bosom of the waters. The navigator, traversing at night the branches of the Orinoco delta, sees with surprise the crowns of these palms lighted up by large fires. These are the habitations of the Guaranis suspended from the trunks of the trees. These people stretch mats in the air, fill them with earth, and on this bed of wet clay light what fires they require for household purposes. For ages they have owed their liberty and political independence to the treacherous and miry nature of their soil, which they traverse in seasons of drought, and over which they alone know how to pass in safety; to their isolation in the delta of the Orinoco, and to their living in the trees.» Consult: Von Humboldt, ‘Voyage aux Régions Equinoxiales,’ Vol. VIII., p. 363 (1807–27).

Mu'ridæ, the family of mice and rats (qq.v.).

Murillo, mū-rĭl'ō (Sp. moo-rēl'yō), **Bartolomé Estéban,** bär-tō'lō-mā ās-tā'bän, Spanish painter; b. Seville, end of December 1617; d. there 3 April 1682. He began his art education under Juan del Castillo, and in 1642 sought wider experience in Madrid, where his townsman Velasquez was enjoying a brilliant career. By the latter he was dissuaded from a contemplated visit to Rome and secured facilities for studying in the Royal Galleries and in the Escorial. Here he placed himstlf for three years under the inspiration of Ribera, Titian, Rubens, Vandyke and Velasquez himself. In 1645 he returned to Seville where he undertook to paint 11 separate pictures for the cloister of Saint

Francis in illustration of Franciscan history. These works proved the foundation of his renown. The principal pieces of this series are 'Saint James Distributing Alms' (now in the Academy Fernando, Madrid); the so-called 'Angel Piece' (in the Louvre); 'The Death of Saint Clara' (in the Dresden Gallery). These strike the note of the early Seville school, being warm in tone, and exhibit Murillo as drawing his types of beauty from the lower orders of the Spanish people. Of even more transparent coloring are his 'Saints Leander and Isidore' in the sacristy of the Cathedral at Madrid; 'The Birth of Mary' (in the Louvre); and the 'Vision of Saint Anthony' (in Seville Cathedral, 1656); both of these latter belong to the middle period of his artistic development. In 1665 he began his four pictures for the Church of Santa Maria pa Blanca, among them being his 'Church Triumphant'; 'The Immaculate Conception' (in the Louvre); and 'The Foundation of the Church of Santa Maria Maggiore at Rome' (in the Madrid Academy). In 1668 he painted his 'Madonna Hovering in the Clouds Surrounded by Eight Saints of Seville' (in the chapter house of Seville cathedral); and about 1670 his 'Holy Family with Elizabeth and The Infant Baptist' (in the Louvre). His most brilliant period was between 1670 and 1680; and in 1674 he had completed the eight vast pictures illustrating the 'Corporal Works of Mercy.' These were intended for the church of the Caridad Hospital, and are remarkable for splendor of coloring and strength of design; the faces are lifelike in expression and the composition and perspective faultless. His 'Saint Elizabeth of Hungary Nursing the Sick' (in the Madrid Museum) belongs to this period. In 1676 he executed 20 pictures for the Capuchin monastery at Seville, 17 of which are now in the local museum. It was at this time he painted the famous 'Immaculate Conception' which Maréchal Soult took to France and sold to the nation for 615,000 francs. It is now in the Louvre, and is the work by which this painter is most popularly known. While Murillo was engaged at Cadiz in painting 'The Betrothal of Saint Catherine' for the high altar of the Capuchin church, he fell from the scaffolding and died as the result of his injuries. The work was completed by his pupil Osorio with no particular success.

Murillo has left about 400 pictures, including his devotional paintings and the many representations of the 'Immaculate Conception,' one of his favorite and characteristic subjects. His most important work in the United States is the altar-piece in the Cathedral of Saint Peter's at Cincinnati. He was the greatest of Spanish religious painters because his Madonnas are real Spanish women and only raised by the magic of his brush into sainthood or apotheosis. But he was a great genre painter also. He knew the gypsies and beggars of Spain as well as he knew the saints. He could paint landscape and portrait, flowers and fruit, maidens and children of that Seville which he loved so well and never left for France or Italy. Unswayed by the influence of the dazzling schools of Tuscany or Flanders he has confined himself to Spanish faces, to Spanish atmosphere and scenery, and has realized a manner and color of his own. If he has sacrificed in this way anything of vigor or variety he has gained far more in originality, sincerity, verisimilitude, and an individuality which is truly national.

Consult: Tubino, 'Murillo, su epoca, su vida, sus quadros' (1864); Curtis, 'Velasquez and Murillo' (1881); Lefort, 'Murillo et ses élèves' (1892).

Mur'muru Palm. See ASTROCARYUM.

Murner, moor'nĕr, **Thomas,** German satirist and opponent of the Reformation: b. Strasburg 24 Dec. 1475; d. about 1536. He studied at the principal universities of Europe, devoting himself particularly to theology and philosophy, and early gained a reputation for ability, marred however by a quarrelsome disposition. He led an unsteady life, preaching for some time at Frankfort-on-the-Main and other places, but incurring generally the displeasure of his congregations by the coarse personalities of his sermons, and was successively expelled from Freiburg, Treves, and Venice. He became one of the most virulent opponents of the Reformation. Some of his writings against the Reformation were burned by order of the diet of Worms; and he was compelled to flee to Switzerland, whence he was in time likewise expelled. The latter part of his history is not known. In 1506 he had been crowned as poet laureate by the emperor Maximilian; and his 'Narrenbeschwörung' (1512), of which his 'Der Schelmenzunft' (1512) may be regarded as a continuation, is one of the most remarkable imitations of Sebastian Brant's celebrated satirical poem entitled 'Narrenschiff.' He wrote 'Chartiludium logice,' etc. (1507), and other Latin works; prepared a German version of Virgil and other translations; and was also regarded as the editor of 'Eulenspiegel.' But he is chiefly remembered by his writings against Luther and the Reformation. His most celebrated satirical work is entitled 'Von dem grossen Lutherischen Narren' (1522; new ed., 1848). Consult: Lappenburg, 'Murners Eulenspiegel' (1854); Goedeke, 'Murners Narrenbeschwörung' (1879); Kawerau, 'Thomas Murner und die Kirche des Mittelalters' (1890).

Mur'phey, Archibald De Bow, American jurist: b. Caswell County, N. C., 1777; d. Hillsboro, N. C., 3 Feb. 1832. He was graduated from the University of North Carolina in 1799 and was for the three succeeding years professor of ancient languages there. He studied law and was admitted to the bar in 1802 and established a large practice. He was a member of the State senate in 1812–18 and proved himself an able legislator, advocating internal improvements and working earnestly to enlarge and improve the educational system of the State. In 1818 he was a judge of the superior court and in 1819–20 was a justice of the supreme court of North Carolina. He published: 'Memoir of Improvements Contemplated, and the Resources and Finances of the State' (1819); 'Reports of Cases in the Supreme Court of North Carolina in 1804–13 and 1818–19' (1821–6); etc.

Mur'phy, Arthur, British dramatist: b. Clooniquin, near Elphin, County Roscommon, Ireland, 27 Dec. 1727; d. 18 June 1805. He was educated at the Roman Catholic College of St. Omer, France, and was subsequently employed in a London banking house. In 1758 appeared his first drama 'The Upholsterer,' a farce, directed against politicians, which proved very successful, followed by 'The Orphan of China'; 'The Way to Keep Him'; 'All in the Wrong'; 'The Citizen'; 'The Old Maid'; 'Three Weeks after Marriage'; 'Zenobia'; 'The Grecian Daughter'; etc. At various times in his life he engaged in political controversies, and edited journals opposing Mr. Fox, the first Lord Holland, and Wilkes' 'North Briton.' His plays are his best performances, and some of them, including 'The Way to Keep Him' and 'Three Weeks after Marriage,' long kept the stage.

Murphy, Charles Francis, American politician: b. New York 20 June 1858. He received a public-school education, in 1900 became a member and treasurer of the board of commissioners for docks and ferries, in 1892–1901 was chairman of the Tammany Hall Democracy, and in 1902 became its chief.

Murphy, Francis, American temperance evangelist: b. Wexford, Ireland, 24 April 1836; d. Los Angeles 30 June 1907. During the Civil War he served in the Union army. In 1870, at Portland, Maine, he began the organization of temperance reform clubs, which were established in all parts of the State, and of which he was the first president. He made his headquarters in Pittsburg, Pa., where, after his first address, in 1876, the pledge was signed by 45,000 people; and before long the signatures secured throughout the United States in response to his endeavors numbered as many as 10,000,000. His labors were also carried into England with noteworthy results. During the Spanish-American War he served as chaplain in the United States army.

Murphy, Franklin, American manufacturer and politician: b. Jersey City, N. J., 3 Jan. 1846. He entered Newark Academy, but at 16 enlisted in the army and served throughout the Civil War, being promoted to the rank of 1st lieutenant; he was engaged in the battles of Antietam, Chancellorsville, Gettysburg, and others of importance. At the close of the war he established at Newark a varnish manufacturing business which has grown into a large establishment of wide reputation. He began his political career as member of the common council at Newark, and was also member of the State legislature for six years. In 1892 he became chairman of the Republican State Committee in which capacity he conducted two successful gubernatorial campaigns. In 1902 he was elected governor of New Jersey by 17,000 majority. He is also a member of the Republican National committee.

Murphy, Henry Cruse, American politician and historian: b. Brooklyn, N. Y., 5 July 1810; d. there 1 Dec. 1882. He was graduated at Columbia in 1830, studied law, was admitted to the bar in Brooklyn, became city attorney there, and in 1842 was elected mayor. In 1843 he was elected to Congress; was a delegate to the New York Constitutional Convention in 1846; and in 1847 re-entered Congress. From 1857 to 1861 he served as United States minister to Holland. He became well known as a journalist, being for some time editor of the Brooklyn *Eagle;* and through the publication of his studies in the colonial history of New York valuable documents were brought to light. He translated from the Dutch De Vries' 'Voyages from Holland to America, 1632 to 1644' (1853), and his other publications include: 'Henry Hudson in Holland: Origin and Objects of the Voyage which Led to the Discovery of the Hudson River' (1859); 'Jacob Steendam, Noch Vasatet' (1861); 'Anthology of the New Netherlands' (1865); and 'The Voyage of Verrazzano' (1875).

Murphy, John Francis, American painter: b. Oswego, N. Y., 11 Dec. 1853. He came to New York in 1875 and educated himself in art, giving especial attention to landscape painting. His first picture to appear in the National Academy of Design was exhibited in 1876, and since 1887 he has been a National Academician. His painting 'Tints of a Vanished Past' gained the Haligarten prize (1885). In 1887 he was awarded the Webb prize by the Society of American Artists of which he is a member.

Murphy, Nathan O., American politician: b. Jefferson, Maine, 14 Oct. 1840; d. 23 Aug. 1908. He was educated in the public schools; was a teacher in Wisconsin, 1866–9; removed to Arizona about 1870; engaged in mining, law practice, and railroad construction; was governor of the Territory in 1892 and in 1898–1902; and in 1893 was elected territorial delegate to Congress by the Republican vote.

Murphysboro, mŭr'fĭz-bŭr-ō, **Ill.,** city, county-seat of Jackson County; on the Big Muddy River, and on the Mobile & O., the St. Louis V., and the Illinois C. R.R.'s; about 140 miles south of Springfield. It is situated in an agricultural section, and nearby are coal-fields, timber, and building stone. The chief industrial establishments are foundries, machine-shops, flour and lumber mills, and brick and tile yards. There is a large trade in farm and dairy products, coal, and lumber. Pop. (1890) 3,880; (1900) 6,463; (1910) 7,485.

Mur'rain, loosely, any widely prevailing and contagious disease among domestic animals. The term is applied to various specific disorders in different localities, but more particularly to the epizootic diseases, especially those of cattle. Still more strictly it is limited to the plague commonly known as the foot-and-mouth disease (aphthous fever), which attacks cattle and other animals, causing loss of appetite, febrile disturbance, lameness, vesicular eruptions on the feet and in the mouth, etc., with frequent complications. See ANTHRAX; CATTLE-PLAGUE; RINDERPEST; TEXAS FEVER.

Murray, mŭr'ā, **Alexander,** American naval officer: b. Chestertown, Md., 1765; d. Philadelphia 6 Oct. 1821. In 1776 he received a commission in the then half-organized navy, and while waiting for sea duty entered the army, serving (1776–7) as lieutenant and captain in the 1st Maryland regiment, and participating in the actions and operations near New York. Toward the end of 1777 he was given command of the Revenge with letters of marque; was captured by the British, exchanged, served with distinction on the Trumbull; was again captured and exchanged; then took command of a privateer, and served later on the Alliance. In 1798, on the reorganization of the navy, he was appointed captain and during the difficulties with France commanded the Montezuma. Transferred to the Constellation, he served in the Mediterranean during the war with Tripoli, in which he initiated actual hostilities by attacking a flotilla of the enemy. After that war he was mainly engaged in shore duty until his death.

Murray, Alexander, Scottish linguist: b. Dunkitterick, Kirkcudbrightshire, 22 Oct. 1775; d. Edinburgh 15 April 1813. With little but self-acquired education he learned not only English, but Continental and Oriental languages, Latin, Greek, and Hebrew. After studying at the University of Edinburgh he settled as pastor (1808) at Urr, and four years later became professor of Oriental languages at Edinburgh. He edited Bruce's 'Travels' (1805), and his works include 'Outlines of Oriental Philology' (1812) and 'History of the European Languages,' the latter published after his death, with an autobiography and memoir (1823).

Murray, David, American educator and author: b. Delhi, N. Y., 15 Oct. 1829; d. New Brunswick, N. J., 6 March 1905. He was graduated from Union College in 1852 and in 1863–73 he was professor in Rutgers College. In 1873–9 he was adviser to the Imperial minister of education in Japan and in 1880 became secretary of the New York Board of Regents. He published: 'Story of Japan' (1894); 'History of Education in New Jersey'; 'History of Delaware County, N. Y.'; etc.

Murray, David Christie, English novelist: b. West Bromwich, Staffordshire, England, 13 April 1847; d. London 1 August 1907. He was educated privately and his first journalistic work was done on the Birmingham press. He removed to London in 1873 where he wrote for the *Daily News* and for the *World,* and in the Russo-Turkish war he was special correspondent for the *Times.* His first novel 'A Life's Atonement' was published in 1879 and he afterward devoted himself to fiction. Among his novels are: 'Way of the World' (1884); 'The Weaker Vessel' (1888); 'A Rising Star' (1894); 'This Little World' (1897); 'Despair's Last Journey' (1901); etc.

Murray, George Henry, Canadian politician: b. Grand Narrows, Nova Scotia, 7 June 1861. He was educated in Grand Narrows and in Boston University and was admitted to the bar in 1883. He was appointed to the legislative council of Nova Scotia in 1889 and in 1896 became premier and provincial secretary of Nova Scotia under a Liberal administration. He was elected to the Dominion Parliament in 1897.

Murray, Grenville («Eustace Clare»), English journalist: b. 1824; d. Passy, France, 20 Dec. 1881. He was in the diplomatic service from 1851 to 1868, but was generally in discord with his superiors or with British residents. From 1869 he lived in France, where he was Paris correspondent of the *Pall Mall Gazette* and the *Daily News,* and an early contributor to the 'Cornhill.' He was one of the ablest journalists of his time. A voluminous writer, among his works were: 'The Roving Englishman,' chapters of travel (1854); 'Embassies and Foreign Courts' (1855); 'The Member for Paris' (1871); 'Young Brown' (1874); 'Turkey' (1877); 'The Russians of To-day' (1878); 'Under the Lens: Social Photographs' (1885).

Murray, James, Scottish soldier: b. about 1725; d. 1794. He was a son of the fourth Lord Elibank, and about 1740 entered the army; came with his regiment to America in 1757; at the siege of Louisburg (1758) commanded a brigade; and in the battle on the Heights of Abraham (13 Sept. 1759) led the left wing of the army under Wolfe. In 1760 he held Quebec against superior numbers of the French, in the same year served with Amherst in the reduction of Montreal, and was made governor of Quebec. From 1763 to 1766 he was governor of Canada; in 1774 became governor of Minorca; was compelled to surrender Fort Saint Philip to the French, in 1782, after a heavy siege, and upon returning to England was court-martialed and acquitted. In 1783 he was made a full general in the British army. Consult: Parkman, 'Montcalm and Wolfe' (1884, 1898).

Murray, James Augustus Henry, Scottish philologist and lexicographer: b. Denholm, near Hawick, Roxburghshire, 1837. He was graduated B.A. of London University, from 1855 till 1858 was an assistant master in Hawick Grammar-school, becoming in the latter year master of Hawick Academy, for a few years was foreign correspondent to the Oriental Bank in London, and from 1870 till his removal to Oxford in 1885 a master at Mill Hill School. He was president of the Philological Society in 1878–80 and 1882–4. Since 1879 Dr. Murray has been general editor of the 'New English Dictionary on Historical Principles,' the great work issued under the auspices of the Philological Society from the Clarendon Press, Oxford. Other works by him are: 'A Week among the Antiquities of Orkney' (1861), 'Dialects of the Southern Counties of Scotland' (1873), 'Synopsis of Paley's *Horæ Paulinæ*' (1872), 'The Romance and Prophecies of Thomas of Ercildoune' (1875), the article 'English Language' in the 'Encyclopædia Britannica' (9th ed.), and many papers on the archæology, natural history, geology and language of the border counties of Scotland. In 1884 he was awarded a civil list pension of £270 per annum.

Murray, or **Moray, James Stuart,** Earl of. See Stuart, James.

Murray, John, American clergyman, founder of American Universalism: b. Alton, Hampshire, England, 10 Dec. 1741; d. Boston, Mass., 3 Sept. 1815. He was brought up in Ireland, where he joined the Methodist congregation and did some preaching, but in 1760 went to England, came under the influence of James Relly, and was excommunicated by Whitefield. He came to America in 1770; preached in Newport, Boston and Portsmouth his peculiar doctrines, which agree with modern Universalism only in the belief of universal salvation, but otherwise held to the dogma of the Trinity, of a personal devil, and of the incarnation; and at the outbreak of the Revolution was chaplain of a Rhode Island brigade for a short time, during which his resignation was demanded by the orthodox chaplains in the army. He formed a Universalist church in Gloucester, and in 1783 recovered property belonging to his parishioners which had been seized by the parish authorities, who acted on the ground that the Universalists had no corporate existence; the success of this suit was a distinct advance in congregational freedom in New England. At his death he was in charge of the Universalist Society of Boston. He wrote 'Letters and Sketches' (1812), and an 'Autobiography,' continued and edited by his wife (1816).

Murray, John, English publisher: b. London 27 Nov. 1778; d. there 27 June 1843. He began business in 1799, early attained success, and became the friend of, as well as publisher for, some of the chief writers of the day, including Byron, Moore, Rogers, Campbell, Crabbe, Washington Irving, George Borrow, and Benjamin Disraeli. He started the 'Quarterly Review' in February 1809 in opposition to the Whig 'Edinburgh Review,' of which Gifford, S. T. Coleridge, and Lockhart were editors, and Scott and Southey contributors. By 1817 the 'Quarterly' was a great success. In 1824 Murray was involved in the controversy with Moore regarding the destruction of Byron's 'Memoirs'; and in 1826 undertook the publication of the *Representative,* a daily newspaper, which, after running six months was discontinued at a loss of $130,000. Consult: Moore, 'Life of Byron' (1830); and Smiles, 'A Publisher and his Friends' (1891).

Murray, Sir **John,** Canadian scientist: b. Coburg, Ontario, 3 March 1841. He was educated at Edinburgh University. In 1867 he accompanied for biological purposes an expedition to Spitzbergen and Greenland, and in 1872 was appointed one of the scientific staff of the Challenger expedition. From 1876 till 1882 he was chief assistant-editor of the scientific reports published in connection with that voyage, and in the latter year became editor-in-chief. He also accompanied several other scientific exploring expeditions in various parts of the world. Besides editing the Challenger reports a large number of papers on geographical, oceanographical, and biological subjects. He has received many honors from learned bodies, including the Royal Society's royal medal, the Founder's medal of the Royal Geographical Society, and the Cuvier prize of the Institute of France.

Murray, John Clark, Canadian educator: b. Paisley, Scotland, 19 March 1836. He was educated in the universities of Edinburgh and Göttingen and in 1862 accepted the chair of philosophy in Queen's University, Kingston, Canada. Since 1872 he has been professor of moral philosophy in M'Gill University, Montreal. He has published: 'Outlines of Sir W. Hamilton's Philosophy' (1870); 'The Ballads and Songs of Scotland' (1874); 'A Handbook of Psychology' (1885); 'An Introduction to Ethics' (1901); etc.

Murray, John O'Kane, American historian: b. Glenariffe, Ireland, 12 Dec. 1847; d. Chicago, Ill., 30 July 1885. He removed to the United States where he became a physician and author of some repute. His most important work was a 'Popular History of the Catholic Church in America' (1876) and among his other books are: 'The Catholic Heroes and Heroines of America' (1878); 'Lessons in English Literature' (1883); etc.

Murray, Lindley, American grammarian: b. Swatara, Lancaster County, Pa., 22 April 1745; d. Holgate, near York, England, 16 Feb. 1826. He was son of M. L. Murray (q.v.). He studied the law (1761–5) and practised as a barrister; but after the Revolution quitted the bar for commercial speculation, and having realized a fortune, went, in 1784, to England for reasons of health, and settled at Holgate, near York. His 'English Grammar' (1795) met with a truly enormous success, being almost universally introduced as a text-book in England and the United States, and for years was regarded as the standard authority. It passed through nearly 50 editions in its original form, and was abridged, enlarged, simplified, and otherwise edited. A corrected edition by the author was published in 1816, and his abridgment (1818) of this went through 150 editions, each of 10,000 copies. His work was far from accurate, however, and was soon superseded; but it freed a difficult subject from chaos. He wrote further educational and religious works, and an autobiography edited and continued by Frank (1826).

Murray, Mary Lindley, American heroine: b. Pennsylvania; d. New York 25 Dec. 1782 (O. S.). She is known through an incident of the Revolution. On 15 Sept. 1776 the British line of march passed her residence, "The Grange," a small country-seat at Murray Hill, New York. Putnam, having evacuated New York, was at the same time marching along the Bloomingdale road near the North River, intending to join Washington at Harlem Heights. Howe thought by marching across the island to cut off the American retreat. He was, however, invited, with his officers, to luncheon at "The Grange" by Mrs. Murray, accepted, and remained more than two hours, during which time Putnam escaped. A bronze tablet in commemoration was placed in the parked enclosure on Park Avenue below 37th Street on Evacuation day (25 Nov.) 1903.

Murray, William, Earl of Mansfield. See Mansfield, William Murray, Earl of.

Murray, William Henry Harrison, American writer: b. Guilford, Conn., 26 April 1840; d. there 3 March 1904. He was graduated from Yale in 1862, entered the Congregational ministry the next year and held pastorates in Greenwich and Meriden, Conn. In 1868 he became pastor of Park Street Church, Boston, and from 1869 to 1873 delivered Sunday evening talks in Boston Music Hall to crowded houses. He resigned his charge in 1874. He published 'The Perfect Horse' (1873); 'Adirondack Tales' (1877); 'How Deacon Tubner Kept New Year's' (1887); 'Adventures in the Wilderness'; 'Deacons'; 'Music Hall Sermons'; 'Sermons from Park Street Pulpit'; 'The Doom of Mamelons'; etc.

Murray, William Vans, American diplomat: b. Maryland about 1762; d. Cambridge, Md., 11 Dec. 1803. He received a classical education and after peace was declared in 1783 he went to London and studied law. He returned to the United States in 1785 and established a law practice in Maryland. In 1791–7 he served in Congress where he gained a reputation as a learned and skilful legislator and in 1797 was appointed by Washington minister to the Netherlands. He was envoy to France in 1800 and was chiefly instrumental in concluding the treaty between the United States and that country. He then returned to the ministry at The Hague and remained there until 1801 when he retired from public life. He published, 'The Constitutions and Laws of the United States.'

Murray, the largest river of Australia, rising in the Australian Alps, its sources being partly in New South Wales, partly in Victoria. It flows for a long distance westward, forming the boundary between these two colonies, then passes into South Australia, where it takes a southern direction, and falls into the Indian Ocean at Encounter Bay, 39 miles southeast of Adelaide, after passing through a large shallow sheet of water called Lake Alexandrina. Its total length is about 1,300 miles. Its chief affluents are the Murrumbidgee and Darling. It is navigable by light draft steamers in the wet season, for the greater part of its course to Albury, 190 miles northeast of Melbourne.

Murray Bay, or **Malbaie,** Canada, a village of Charlevoix County, Quebec, on a bay of the Murray estuary, near the north bank of the Saint Lawrence River, 90 miles east of Quebec. It has lumber industries, and its dependent suburbs, Pointe à Pic and Cap à l'Aigle, at each end of the bay, are popular summer resorts, the surrounding country being very attractive and affording angling, rowing, bathing, and other facilities. Steamboats connect with Quebec. During the Revolutionary War, Murray Bay was a station for United States prisoners of war. Pop. about 1,000.

Murre, mėr, or **Murrelet,** an auk (q.v.) of the genera *Uria, Cepphus,* and related groups; a guillemot. They are small, black-and-white, web-footed, diving, fish-eating birds, which abound on all rocky northern coasts, breeding on sea-fronting ledges, where each pair produces a single, large, pyriform, variously colored egg, which is not placed in a nest but incubated in turn by the parents, who lift it from the ground upon their webbed toes and warm it between their downy legs. Several diminutive and handsomely ornamented species of the coasts of the North Pacific are called murrelets. Consult: Baird, Brewer and Ridgway, 'North American Water-Birds' (1884); and the writings on arctic ornithology of Fielden, Nelson, Turner, Murdock, etc.

Mur'rine Vases are antique vessels, distinguished for costliness of material and beauty of execution. They were brought by Pompey from Asia to Rome, and bore an immense price. Some antiquarians have supposed them to have been made of a mineral of the class of sardonyx or agate, or of a kind of porcelain or glass.

Murrumbidgee, mŭr-ŭm-bĭd'jē, Australia, a large river of New South Wales, rising in the Gourock Range above Numeralla about 80 miles from the Pacific Ocean. It flows at first northward, but the greater part of its course is westerly; and after receiving the Lachlan from the north, near Nap Nap, it turns toward the south to join the Murray below Balranald. It flows through a fertile and picturesque district, but is navigable only in the wet season. Length about 1,300 miles.

Murshidabad, moor-shē-dä-bäd', India, a town and administrative headquarters of a district of Bengal, 116 miles north of Calcutta, on the Bhaghirathi, a branch of the Ganges. It is a straggling collection chiefly of mud houses occupying an extensive area, but has several substantial brick buildings, chief of which are the beautiful Nawab's palace dating from 1837, the imambara and a Moslem mosque. Two miles south of the city is Motijihl or Pearl Lake and the site of the historic palace of Suraj-ud-Dowlah. On the opposite bank of the river connected by a ferry is Azimganj containing the old cemetery of the Nawabs, a mausoleum, mosque, etc. The city is noted for its ivory carving, its embroidery in gold and silver lace, silk weaving, and the manufacture of hookah pipes, and musical instruments. It is still a busy centre of trade but less so than during the 18th century when it was the capital of Bengal and a very populous city, the rise of Calcutta causing its decline. Pop. about 16,000 with Azimganj 30,000.

Musa ibn Nosair, moo'sä ĭb'n nō-sīr', Arabian conqueror: b. Mecca, Arabia, about 660; d. Hedjaz, Arabia, 717. He conquered northern Africa in 699–709 and became its governor in 712. Jealous of the success of Tarik, whom he had sent to conquer Spain, he tried to wrest from Tarik his glory by his own brilliant conquests. This conduct brought upon him the displeasure of the caliph of Damascus who recalled him, stripped him of his honors and caused him to be killed. Other authorities state that he died in extreme poverty. See Burke's 'History of Spain,' Vol. I. (1895).

Musa (moo'sä) **Bay,** a bay formed by the western end of Fuga Island, Philippines (lying north of Luzon) and two small adjacent islands. Although it is well protected from the sea, it is resorted to for shelter only in cases of necessity, as the coral bottom makes anchorage insecure; it is, however, one of the cruising ports of the United States Navy among the outlying island groups of American possessions in the northern part of the Philippine Archipelago.

Musa'ceæ, the banana family, a group in the Order *Scitamineæ,* comprising the largest of herbaceous plants, generally destitute or almost destitute of true stems, yet resembling trees in appearance, and sometimes rivaling palms in stateliness, the long sheathing bases of the leaf-stalks combining to form a false stem. The blade of the leaf has many fine parallel veins proceeding from the mid-rib to the margin. The flowers are congregated on spadices, which are protected by spathes. The fruit is either a 3-valved capsule or fleshy. The species are not numerous; they are natives of warm climates, in which they are widely distributed, and are of great value to the inhabitants of tropical countries; the fruit of some, particularly of the genus *Musa,* being much used for food, while the fibres of the leaves are employed for cordage and for textile purposes (see BANANA; FIBRE).

Musæus, mū-sē'ŭs, in Greek mythology, a poet, seer, and priest, said to have been the son of Eumolpus and Selene, or, according to others, the son and pupil of Orpheus. He was the reputed author of a number of poems, oracles, purificatory verses, hymns, etc., of which we possess but a few fragments, and those of doubtful authenticity. A later Musæus, who flourished about the end of the 5th century A.D., was the author of a beautiful little poem in Greek, entitled 'Hero and Leander.' See HERO.

Musäus, moo-zā'oos, **Johann Karl August**, German author: b. Jena 29 March 1735; d. Weimar 28 Oct. 1787. He studied theology; was master of the pages at the Weimar court, and in 1770 became professor in the Weimar gymnasium. His writings, characterized by humor, simplicity, and kindly satire, include ‘Der deutsche Grandison’ (The German Grandison); ‘Physiognomische Reisen’; ‘German Popular Tales’ (Volksmärchen der Deutschen), and a series of tales entitled ‘Straussfedern’ (Ostrich-feathers). Consult ‘Life’ by Müller (1867).

Mus'cæ Volitan'tes (literally, «floating flies»), in physiology, the name given to certain common phenomena of vision giving the appearance of motes or small bodies floating before the eyes. One class of these specks are a precursor of amaurosis; but another and more common class are quite harmless, and may be seen by anyone under proper conditions. A deranged stomach helps to give them greater prominence.

Mus'cardine. See SILKWORM.

Muscarin, a coal tar color introduced by Durand and Hugenin, and having the empirical formula $C_{18}H_{15}N_2O_2Cl$. It is a brownish violet powder, slightly soluble in cold water, but dissolving readily in hot water with the formation of a violet-blue solution. Powdered zinc decolorizes its aqueous solution, but the color returns upon exposure to air. Muscarin produces a blue color upon cotton that has been mordanted with tannin and tartar emetic.

Muscarine, an alkaloid having the chemical formula $C_5H_{15}NO_2$, and occurring in certain mushrooms, notably in the «fly agaric» (*Agaricus muscarius*). It is also formed in the putrefactive decay of flesh. It may be obtained in the form of deliquescent crystals which are without taste, and insoluble in ether, though readily soluble in water and in alcohol. Solutions of the alkaloid are strongly alkaline, and precipitate ferric and cupric salts in the form of hydrates. Muscarine is exceedingly poisonous. It contracts the pupil of the eye, slows the pulse by prolonging the diastolic state of the heart, and induces salivation, vomiting, intestinal spasms, and general muscular weakness, followed by death. The «fly agaric» takes its name from the fact that flies that alight upon it are killed, either by the muscarine or by another alkaloid, neurine, which the fungus also contains.

Muscat, mŭs-kăt', **Muskat**, or **Maskat**, Arabia, the capital of Oman, on the Gulf of Oman, commanding the entrance to the Persian Gulf. It is a fortified seaport of considerable commercial and strategical importance; the seat of the Imam or Sultan of Muscat; by arrangement has a British political resident; and since 1898 is used as a coaling station by France. Its appearance by no means corresponds with its wealth and importance. Large buildings are few, and the sultan's palace (a plain edifice), the governor's house, and a few minarets, alone rise above the mass of flat-roofed huts or houses. The streets are extremely narrow and its situation at the foot of high cliffs, and nearly surrounded by bare rocks, renders it one of the hottest places in the world. A sufficient supply of water is obtained from wells about 40 feet deep. About three miles distant is the town of Mattrah with docks for building and repairing shipping. As it stands in an open plain, exposed to the sea-breeze, it is cooler than Muscat, so that many of the wealthier merchants of the latter place have their dwellings at Mattrah, and spend only the hours of business in the neighboring city. The combined population of Muscat, Mattrah, and intervening villages, has been variously estimated at 25,000 and at 60,000.

Muscat was occupied by the Portuguese under Albuquerque in 1507. In 1651 it fell again under a Mohammedan ruler. In the latter half of the 18th century it attained, under a ruler who bore the religious title of Imam, considerable importance as a seaport. In 1808 Seid Saïd succeeded to the sovereignty, having assassinated his cousin Bedr. His sovereignty embraced also a stretch on the east coast of Africa, extending from the neighborhood of Cape Delgado northward as far as the equator. In like manner a large portion of the coast of the Persian Gulf acknowledged his sway, so that, including Omân and the African islands Zanzibar, Monfia or Mafia, and Pemba, the coasts ruled by him, for the most part only commercially, could not have had an extent of less than 3,000 miles. In 1840 Seid Saïd removed the court and seat of government from Muscat to Zanzibar, and in 1856 died on the return voyage from a visit paid to the former place. His son Mejed succeeded him as Sultan of Zanzibar and ruler of the African territory, and another son acquired Muscat. Seyyid Toorkee became ruler of Muscat in 1871, and on his death in 1888 a son succeeded him.

Mus'catel, a name given to French and Italian wines, white or red.

Muscatine, mŭs-ka-tēn', Iowa, city, county-seat of Muscatine County; on the Mississippi River, and on the Iowa C., the Chicago, R. I. & P., and the Burlington, C. R. & N. R.R.'s; about 25 miles below Davenport and 140 miles east by south of Des Moines. It is at a bend in the river where the waters change from a westward to a southward current. As usual along the west bank of the Mississippi, the city is on high bluffs which command an extended view of the river. It was first settled in 1833, and in 1839 was incorporated. It is situated in a fertile agricultural region in which there is considerable wood land. Muscatine Island, just below the city, is noted for its watermelons. The chief industries of the city are connected with the manufacturing of foundry and machine-shop products, oatmeal, flour, pickles, brick, tile, boxes, buttons, packing cases, wagons, carriages, pottery, rolling-mill products, canned goods, lead works, and lumber. It has considerable trade in its manufactured articles, farm and dairy products, hogs, lumber, and fruit.

Muscatine has good public and parish schools and several private schools. It has the public Musser Library. It has also several charitable institutions. The government is vested in a mayor, who holds office two years, and a council. The school board, police judge, treasurer, assessor, and wharf master are chosen at a popular election by the people. The waterworks are owned and operated by the city. Pop. (1910) 16,178.

Muschelkalk, mŭsh'ĕl-kälk, a German name, signifying shell lime, applied to geological beds of middle Triassic or New Red Sandstone period, occurring in the Alps, in northwestern Germany, Alsace and Lorraine, Swabia, Franconia, Hesse, Thuringia and upper Silesia. The name is due to the many fossil remains of Cephalopods, Encrinites, and Mollusks in general found in the limestone mass of these beds. The Muschelkalk is divided into lower, middle and upper.

Muscle-reading, a form of observation whereby one who is specially trained may, by careful study of muscular movements, interpret many thoughts that are in the minds of others. This is possible because many thoughts are expressed in some manner of muscular action. Thus a person who is told to think steadily, bearing in mind a certain number, unconsciously says that number over and over to himself, making thereby very minute muscular movements of the lips. These can be seen and read by a skilled person, and thus is explained the common trick of many so-called clairvoyants. This tendency of motor expression of mental images is very pronounced in some people. They involuntarily go toward or away from a hidden object, and a blindfold person can often find these objects by carefully noting the degree of muscular resistance or acquiescence in their search for such objects. This parlor trick takes much practice, a quick sense, and much concentration, but does not involve any «thought-transference,» or «mind-reading.» Some people become very skilful in this type of observation, and all may acquire a certain amount of skill by careful watching. Much of the so-called intuition of women is in reality muscle-reading. They are on the lookout for certain forms of muscular reaction, and can thus guess at what is going on in the minds of others. Their constant contact with small children, who characteristically show what they are thinking about, through their muscles of expression, is a school of experience for them. (See EMOTIONS.) Consult: Jastrow, 'American Journal of Psychology,' Vol. IV., p. 398; Preyer, 'Die Erklärung des Gedankenlesens' (1886); and 'Fact and Fancy in Psychology' (1900).

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Muscle-sensation, a loose and vague phrase, otherwise muscle-sense, to express the sum of sensations that come from the joints, skin, muscles, and tendons in the act of making muscular movements. It is also applied to a generalized dull sensation which results from the stimulation of a muscle, either from electrical discharge, or from fatigue following the long-continued stimulation of either a voluntary or involuntary muscle. The perceptions of muscular sense are usually grouped under (1) those of posture; (2) those of passive movement; (3) those of active movement; (4) those of resistance to movement. The muscle-sense is of much importance in imparting information concerning the relative position of the different members of the body, and its loss in this particular (asterognosis) constitutes a valuable symptom in the diagnosis of certain nerve disorders. The muscle-sense is all-important in maintaining bodily equilibrium. Each joint in the body possesses a varying degree of delicacy in this function of equilibrium. Thus the shoulder-joint is considered to be 40 times as delicate in this respect as the joints of the fingers. Angle of bending and speed of movement are both important in the interpretation of these joint-sensations. Muscle-sense in all its bearings has close relations to accuracy and skill in all limb-movements, as seen in marksmanship, ball-playing, billiards, golf, etc., in all sports and games requiring delicate muscular adaptations.

Consult: Henri, 'Année Psychologique,' Vol. V. (1899), with full bibliography; Baldwin, 'Dictionary of Philosophy and Psychology', Schäfer, 'Physiology' (1900).

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Muscles. The organs called muscles are made up of a collection of muscle-cells, which have for their function the accomplishment of bodily movements. These movements may be gross, as in walking, or very minute, such as take place in the contracting movements of the arteries or veins; they may be voluntary, called into action by willed impulses from the brain, or they may be involuntary and brought about by different stimuli from some part of the central nervous system. The muscular movements necessary in writing are illustrative of the voluntary type; the heart-beat, of the involuntary variety. In point of evolutionary development the involuntary movements may be said to have preceded the voluntary, and hence in regard to complexity of structure the involuntary muscle-cells are simpler than the muscle-cells that perform voluntary movements, and to these two types of cells students of minute anatomy have given the names of unstriped or involuntary muscle, and striped or voluntary muscle. The muscular tissue of the heart is of intermediary character. It is a striped involuntary muscle. Muscle-tissue, like protoplasm, is strongly contractile, but unlike ordinary protoplasm, which can contract in all directions, muscle-substance can contract in only one direction. The simplest type of muscle-substance is seen in many lower animals. In these the muscle-cells are elongated spindles with sharpened ends and with a single elliptical to rod-shaped nucleus, situated about the middle of the fibre. They show a faint longitudinal striation, vary in length from 40 to 500 microns (1-600, 1-50 of an inch) in length, and 3 to 8 microns (1-8000, 1-3000 inch) in diameter. These muscle-cells in man correspond to the unstriped muscle-cells, are bound together in bundles, or flattened plates by an intercellular cement-substance, and are found more particularly in the walls of the intestine, the trachea, bronchi, blood-vessels, bladder, ureter, uterus, in many of the organs of the body, and in glandular structures. They have a rich blood-supply, and a nervous network of sensory terminal filaments, as well as fibres from the sympathetic nervous system. The pains of an intestinal colic, of a gall-stone, of childbirth, are all due to forcible contractions of these involuntary muscle-cells in the respective organs. The more prominent muscles of the body, such as those that move the various bones, the muscles proper, and such as are eaten as roast beef, are of the striped variety. These are a modification of the simple spindle-cells. In man they originate in the mesoderm (q.v.); muscle-substance commences to form in the interior of some of the cells; these elongate, many nuclei are formed, and the final result is a bundle of much elongated cylindrical cells 12 cm. (2 inches) long and from 10 to 100 microns (1-2500 to 1-250 inch) broad. Each cell is covered by a special sheath, the sarcolemma, and within is made up of very intricate and minutely structured protoplasm, the most striking feature of which is its banded or striated appearance; hence the name striated. Just within the sarcolemma a number of flattened elliptical muscle-nuclei are found. In insects striped muscle-tissue can be studied to best advantage. Occasionally branched forms of striated muscle are found. Blood-vessels are numerous in striped muscle, and lymphatics and nerves are also abundant. Special types of nerve-endings, muscle-plates, are characteristic of voluntary muscle.

Heart-muscle differs from ordinary striped muscle by having shorter oblong cells, which are branched. There is no sarcolemma, and the cells contain but one or two nuclei, which are situated in the centre of the muscle-substance. Blood-vessels, lymphatics, and nerves are plentiful in the heart muscle.

Groups of these muscle-cells, with connective tissues, tendons, and fat, make up the gross muscles of the human body. The voluntary muscles are all attached to bony structures; the involuntary muscles are found in the softer parts. Contraction and expansion are the expressions of their functions, each set of muscles being provided with antagonists, and it is characteristic that in response to pleasure-giving stimuli movements of expansion result, whereas under painful stimuli contraction is marked. Modern psychological theories have been founded on this fundamental principle, emotional states being interpreted as being founded on visceral muscular activities. The forms of external stimuli that can cause muscular action are usually classed as mechanial, chemical, thermal, and electrical. Excess of stimulus brings about a condition of fatigue in muscle. This is accompanied by diminished muscular power, by pain or discomfort, by diminished reflex excitability, and by vague symptoms in the body indicative of some perversion of metabolism.

Muscles are classified in various ways; according to structure or according to their function, or by their positions and situations in the body. For example, some muscles are attached to bones, which they move after the fashion of levers. Such muscles are said to arise or take origin from definite points of bones, and are generally inserted into bones by tendinous prolongations of the muscular substance. The insertion is the moving point, and the origin the fixed point of the muscle. The tendons of muscles vary in length and breadth. They represent inelastic bands of fibrous tissue, the fibres of which insensibly merge into and become continuous with their attached muscular fibres. When the tendinous fibres of muscles become greatly broadened out, so as to form fibrous webs or membranes, which separate or enclose muscles, or which afford extensive surfaces for their attachments, the term aponeuroses is then applied to them. Such aponeurotic expansions are seen in the terminations of the muscles of the abdominal wall, in the scalp, and in other situations. The limit or extent of the action of a muscle is determined by the length of its fibres, whilst its degree of force or strength depends on the number of the fibres. Other muscles are not attached to bones as levers, but on the contrary surround and enclose cavities, which they limit or expand as required. Such hollow muscles are exemplified in the heart and uterus, in the muscular fibres of blood-vessels, in the muscles of the digestive tract, in the iris of the eye, etc.

The nature, mode, and effects of muscular action may be briefly considered in connection with the present subject. The muscles which have the most active functions are those most abundantly nourished. Every action on the part of a living being results in the production of a certain amount of waste material, evinced by perceptible differences in the chemical composition of the tissue. And when it is remembered that the nervous and vascular supply of muscle is also concerned in muscular work and waste, the entire question is seen to assume aspects of a very intricate and complicated nature. Increased exercise of muscles — as seen in gymnastic exercises, or in the exercise of certain trades (for example, the arms of the blacksmith and the lower limbs of the ballet-dancer) — demanding increased nutrition, results in the increased growth of the muscle, and in the formation of new tissue. This result, it is evident, can take place only when the nutrition of the tissue keeps pace with, or slightly outstrips its waste and wear.

The property of contractility distinctive of muscular tissue, and through which its functions are manifested, is generally, though not always or invariably, brought into action through the stimulus of the nervous system, or more widely speaking, through stimuli conveyed to the muscular fibres through the nerves. The subject of the various kinds of muscular actions involves both physiological and mechanical considerations. The voluntary muscles thus constitute moving powers for the bones as levers; and in the living body examples of the three kinds of levers which mechanical science distinguishes are found. In the familiar action of the biceps muscle, which flexes or bends the fore upon the upper arm, is seen an instance of a lever of the third kind, in which the power (represented by the insertion of the muscle on the radius or bone of the fore-arm) is placed between the fulcrum (at the elbow-joint) and the weight (in the hand). The lever of the second order may be illustrated by the raising of the body upon the toes, as in the act of making a step forward in walking. Here the weight (represented by the body pressing on the ankle) is placed between the fulcrum (formed by the fixed toes) and the power represented by the muscles of the calf). The head moving on the spine illustrates a lever of the first order; the fulcrum being represented by the atlas vertebræ, the power by the muscles of the neck, and the weight by the heavier portion of the skull situated in front of the spine. See ANATOMY.

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Muscles, Diseases of. Very little is known of the diseases of muscles themselves. Muscle-tissue, in common with other types of tissue, undergoes certain forms of degeneration, fatty, mucoid, gelatinous, calcareous, etc., but of the diseases of the muscular tissues themselves there are few well-defined types. The reason for this lack of definite information bearing on diseases of the muscles is largely due to the close relationship that the nervous system bears to the muscular system. This renders it almost impossible to distinguish between a disease of the muscle and a disease of the nerve which is distributed to that muscle. Thus, at the present time, it is held that many of the forms of muscular atrophy and some of the forms of muscular dystrophy are forms of the diseases of the nervous mechanism of the muscle rather than disease of the muscle itself. In former times these were classed as diseases of muscle.

Myositis, simple inflammation of the voluntary muscles, is a form of acute or subacute inflammation in the muscle, due probably to some infectious organism. It is characterized by stiffness of the muscles and with swelling in the muscle-substance. It is usually progressive, the muscles of the body becoming stiff, hard, and fragile, and undergoing fatty degeneration. Myositis is probably a very rare affection, and it is not yet known whether it is a primary or a secondary condition. Ordinary muscular spasms or muscular cramps are in reality localized neuralgias in the muscle, and should be considered as of nervous rather than muscular origin. Lumbago is one of the conspicuous examples of a neuromuscular affection. Myoclonia or Friedrich's disease, and myotonia, or Thomsen's disease, are two forms of disease affecting the muscular system that have certain alliances with hysterical affections, and although regarded by many as of purely muscular origin, there are many reasons for believing that these diseases are of the neuromuscular type. In myotonia the disease usually comes on in childhood; the muscles become stiff, and the children are noted for being clumsy in their movements. The contractions, as in the hand, for instance, commence very slowly and are performed almost automatically, and when the patient desires to loosen his grasp of an object the muscular response is slow, the contraction often persists, or the patient may be scarcely able to open his hand. In much the same manner walking is affected; the patient starts with difficulty; one leg seems to be stiff and halts; but after a few moments of limbering up, as it were, the patient may be able to walk more or less briskly. The disease is chronic, and is possibly of hysterical nature. No treatment is known.

Myoclonia occurs chiefly in patients of bad nervous condition, and consists in clonic contractions of the muscles of the extremities. These contractions somewhat resemble chorea. Associated muscle-groups seem to be involved in myoclonia, whereas in chorea the contractions are extremely irregular. The disease is probably most closely associated with the convulsive tics and is probably due to some affection of the motor cortex. Treatment seems unavailing.

Myositis ossificans is a very rare chronic affection of muscles, during which the muscles become harder and harder, and finally develop bone-like transformations, so that the patient becomes like the ossified man of the circus. As a matter of fact most of these cases drift into museums and circuses. Very little is known as to the cause of the disease, and treatment is unavailing.

Muscogee, mŭs-kō'gē, Oklahoma; city and county seat of Muscogee County; on the Missouri, Kansas & Texas railroad; 45 miles from eastern border of Oklahoma. It is in the midst of a fertile agricultural region where some attention is given to cultivating wheat and considerable attention to raising cattle. Its chief trade is in wheat and live-stock. A preliminary report in April, 1911, showed this city had 65 manufacturing establishments; value of products, $2,379,000. Muscogee is the headquarters of the Government Indian Agent. Pop. (1910) 25,278. This is an increase of 10,860 since 1907, previous to which no report was made by the U. S. Census Bureau.

Muscogees. See MUSKHOGEAN INDIANS.

Muscovite, or Common Mica, a native silicate of aluminum, potassium and hydrogen, occurring in crystals that belong to the monoclinic system, though usually hexagonal or rhombic in general form, and distinguished by the facility with which it may be split into thin laminæ. Muscovite also occurs in massive forms, and in scaly aggregates. It occurs in various colors, and has a lustre that is vitreous or pearly. It is transparent or translucent, with a hardness of from 2 to 2.5, and a specific gravity of from 2.8 to 3. It is a very common mineral, and is an essential constituent of granite, gneiss, and numerous other rocks. The transparent varieties, when obtainable in considerable size, are used for the manufacture of gas-burner chimneys, for covering the windows of stoves and the "peep-holes" of furnaces, and for other purposes where transparency must be combined with infusibility and with a considerable power of resisting the prolonged action of heat. Considerable quantities of it are mined in Bengal and in Switzerland, and fine deposits occur in many parts of the United States. Perfectly transparent plates a yard in diameter are sometimes found at Grafton, N. H., and similar specimens also occur in the western part of North Carolina. Pulverized muscovite is employed in the preparation of certain kinds of paint, and in the manufacture of insulating material for use about electric machinery. Muscovite is not affected by acids, but decomposes upon being fused with the alkaline carbonates. The name "muscovite" is derived from the older popular name "muscovy-glass," which is supposed to refer to the fact that the Russians used it for window-panes. See MICA.

Mus'covy Duck, or Musk-duck. See DUCK.

Mus'cular Christianity, a phrase originating with Charles Kingsley (q.v.), to denote robust, healthy, religious feeling which encourages and takes an active part in the harmless and healthy amusements of life, as opposed to a puritanical, ascetic, or contemplative form of religion.

Muscular System, Development of. Two main forms of muscle-tissue (see MUSCLES) exist in the human body, the striated muscle-tissue, which makes up the muscles of the bony framework of the body, and is under control of the brain, and the unstriated muscle-tissue, which is under the control of the sympathetic nervous system. (See NERVOUS SYSTEM.) The heart-muscle is regarded as an intermediate form, resembling striated muscle-tissue, but in its development more nearly allied to the more primitive unstriated muscle-tissue. Non-striated muscle-tissue is formed by a direct transition of certain cells in the middle germinal layers (see EMBRYOLOGY) or mesenchyme. At first these muscle-fibres are irregularly distributed, but later they are collected into small bundles or into layers, and become associated with the individual organs with which they functionate. Striped muscular tissue develops from the same layer, but the details of development, as is the case in the histogenesis of the heart-muscle, are extremely complicated. The cells at first develop a mesh-like structure or reticulum. This reticulum develops small disks, which later become small columns of muscular tissue. The columns at first develop at the periphery of the cell, and gradually fill in around the nucleus, which in the heart-muscle lies in the centre of the cell, whereas in the muscles of the skeleton the nucleus is pushed to one side, or disappears, new nuclei appearing just beneath the sarcolemma-sheath. The skeletal muscles develop in regular order from the different segments (somites) of the mesoderm. In the early stages the distribution is very symmetrical, but later it becomes extremely ununiform by reason of the irregular welding of different segments of the bony skeleton. There remains, however, a regular association of the muscular myotomes and their embryonic nerve supply, and the homologies of structure may be traced by the nerve-supply, although the muscles themselves may have shifted from their original position. This is a question of highly technical nature, but has many practical bearings in modern medicine. Thus the great broad muscle of the back, the latissimus dorsi, which arises from the seventh and eighth cervical segments, but later migrates and is fastened all the way down the spine as far as the crest of the hip-bone, is supplied by a nerve which also develops from the seventh and eighth cervical nerves. The developmental history of each skeletal muscle can thus be traced by means of its nerve-supply. The whole process is one of extreme intricacy and should be studied in special monographs.

Evolution of Muscular Tissue.— As in the development of the muscular system in man there has been a gradual evolution of the plan of muscular arrangement, so in the animal series there has been a gradual development of a muscular system from the very simplest types of contractile protoplasm. Even in plants definite movements may occur which may be very slow or very rapid. Yet no muscular tissue proper has ever been found in plants. Many of the lowest plants, the *Algæ*, are motile and are provided with vibratory cilia, but these minute hairs, although capable of rapid motion, cannot be regarded as muscular organs. In the contracting protoplasm of the lowest animals, the rhizopods, although movements take place, yet there is no muscle-tissue. Nor is muscle-tissue found in the next higher group, the *Infusoria*, although very actively moving forms are known, for example, the familiar microscopic animal *Paramecium*. The bell-animalcules, *Vorticella*, *Stentor*, etc., have stalks that coil and uncoil with great rapidity, but they contain no muscle-tissue proper. They do, however, contain what are termed myronemes, and spironemes, which are longitudinally striated and may functionate as muscular organs. In another genus of infusorians (*Bursaria*) there is a contractile band about the body of the animal. It has been regarded as a true sphincter muscle. It has not the structure of the developed unstriped muscle-cell. In the closely allied sponges (*Porifera*) certain elongated cells with rod-shaped nuclei are found, and may be considered the ancestral forms of the unstriped muscle-cell, although it is not until the group of the *Cœlenterates* is reached that true unstriped muscular tissue is present in its more advanced forms. In many of the hydroids a form of external neuromuscular cell is found. This is a type of cell half nerve, half muscle, but not resembling true muscular tissue. In the jellyfishes of this order both neuromuscular tissue and true unstriped muscle-fibres are found. In the sea-anemones unstriped muscle is abundant. It is mostly developed, however, from the external layers of the body, and thus embryologically is not comparable to the muscle-tissue that in practically all the animals higher than the cœlenterates is formed in the middle germinal layers of the developing animal. In one of the higher cœlenterates, the common water-hydra, some muscle-cells are found imbedded in the deeper tissues of the body, thus foreshadowing the higher type of muscular tissue. In the next great family of animals, the *Echinodermata*, to which the sea-urchins, starfishes, and sea-cucumbers belong, unstriped muscular tissue is common, but no evidence of striated or striped muscle is yet present. In the worms the muscular tissue is unstriped and abundant. In the mollusks, the foot of the soft clam, the muscle of the oyster, are made up of unstriped muscle fibres. A higher order, the *Arthropods* or *Crustaceans*, including the crabs, lobsters, etc., contains a well-developed muscular system which is made up of striated muscle, practically the first appearance of this type of muscle in the animal kingdom. In these animals, moreover, there is a type of development of the muscles that anticipates the regular segmented type, metameres or myomeres, of higher animals.

From the crustaceans onward both types of muscle-tissue are found. In the low vertebrates, *selachians* and *fishes*, typical heart-muscle cells, striated and with central-lying nuclei, are found. Consult McMurrich, 'Development of the Human Body,' with full bibliography (1902). See ANATOMY.

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Mus'culus, Wolfgang, German scholar and Protestant theologian: b. Dieuze, Lorraine, 1497; d. Bern 30 Aug. 1563. He entered the Benedictine abbey of Lutzelstein and was ordained priest. He was converted to the Protestant faith by Luther's writings, withdrew from his order in 1527, and in 1531 became pastor of a church at Augsburg. In 1536 he assisted at the Wittenberg assembly, and in 1540 was appointed by the Augsburg senatus a delegate to the ecclesiastical conferences at Worms and Ratisbon. He subsequently became professor of theology at Bern. Among his works are 'Commentarii in Genesin' (1557); and an edition of Polybius.

Muses, goddesses of the liberal arts and sciences; originally nymphs of inspiring fountains. Different accounts are given of their origin. There is also a great difference in their names and attributes. The most celebrated are the daughters of Zeus and Mnemosyne. According to Homer they lived upon Olympus. At first three Muses only were known: Meletē (meditation), Mnēmē (memory, for the immortalizing of great deeds), and Aoidē (song, for the accompaniment of story). Four Muses are sometimes mentioned as the daughters of Zeus and Plusia, namely, Meletē, Aoidē, Archē, and Thelxinoē. At other times they are said to have been seven, at others eight in number. Nine Muses are also enumerated as the daughters of Pierus, king of Emathia; but these are usually held to be different from the nine Muses who ultimately came to be generally recognized in Greece; and although the genuine Muses are sometimes called Pieridæ, they are said to have derived the epithet not from Pierus but the district of Pieria. The names finally recognized as those of the Muses were Clio, Euterpe, Thalia, Melpomene, Terpsichore, Erato, Polyhymnia, Urania, and Calliope. Among the adventures of the Muses their three contests with the Sirens, with the daughters of Pierus, and with the bard Thamyris, in all of which they were victorious, are particularly famous. The customary occupation of the Muses was singing and dancing. Separate attributes were not till a comparatively late period assigned to the individual Muses. Calliope became the Muse of epic poetry. She was the most distinguished among the Muses, the protectress of kings, whom she endowed with eloquence and song. Clio became the Muse of history; Euterpe of lyric poetry and music, particularly of wind-instruments; Thalia of comedy; Melpomene of tragedy; Urania of astronomy; Erato of lyric and erotic poetry; Polyhymnia of the sublime hymn; and Terpsichore of the dance. They are commonly represented as beautiful virgins, adorned with wreaths of palm leaves, laurel, roses, or the feathers of the Sirens. They dance in a circle, together with Apollo, who in later times was styled Musagētēs, or leader of the Muses. Their worship extended from Greece to Italy. In Rome they had a separate temple, and a grove was sacred to them. The swan, the nightingale, and the grasshopper were also sacred to them.

Museum of Art, Metropolitan. See ART, METROPOLITAN MUSEUM OF.

Museums are institutions for the preservation, study and display of natural objects, or of those made by man, while as a sequence of study comes the publication of information thus derived. The word museum originally signified merely a grove or other locality sacred to the Muses, but with the development of the museum the word has undergone a parallel course of evolution until it has come to have its present meaning. The next use of the term was for an institution devoted to the study of philosophy, literature and art, but not including the preservation and display of objects; in this sense it was applied to the famous Museum of Ptolemy Soter at Alexandria. While this was in the nature of a university, there is some reason to believe that collections of plants and animals were attached to the institution, so that it may be regarded as the prototype of the more modern botanical and zoological garden. In the modern sense public museums are of comparatively recent establishment, and as educational factors, of later date than art galleries and libraries, although like these having their beginnings in the gratification of the desires of private individuals. The origin of the art museum is to be found in the collections of statuary, paintings and other works of art, made by kings, nobles and men of wealth; the germs of the modern museum of natural history were the cabinets of miscellaneous curiosities brought together by students, merchants, or men of leisure. Many of these collections subsequently developed into important public museums, the most striking example, and the one most frequently cited, being the British Museum (q.v.), which was the final outgrowth of the cabinet and library of Sir Hans Sloane. In the United States the Museum of Comparative Zoology, at Cambridge, Mass., has grown from the collections made by Louis Agassiz (q.v.) for his own use, until it has become one of the most important museums in this country. Even the United States National Museum, if not the direct outgrowth of a private collection, was indirectly due to the labors of individuals, for its nucleus is to be found in the specimens gathered by the National Institution (later the National Institute), a body organized with the avowed purpose of directing the bequest of James Smithson (q.v.) and engaging in pursuits in accordance with its terms.

The lineal successors of the cabinets of private collectors were the museums of scientific societies where specimens were gathered for purposes of study and display, and while these still exist they have largely given place to museums supported by the state or municipality. Private collections are more numerous than ever, but these are rarely formed with any intention of displaying their contents to the public, although there are some notable exceptions, as in the museum of the Hon. Walter Rothschild at Tring. Ultimately, however, a large proportion of these private collections find their way to public museums through the liberality of their owners.

Another step toward the establishment of public museums was the formation of collections of objects of more or less popular interest and their exhibition to the public on the payment of a fee. Notable examples of these abroad were those of Sir Ashton Lever and Charles Bullock, which flourished in London during the latter portion of the 18th century and first part of the 19th. It is interesting to note that one of the earliest cabinets formed in the United States, that of Mr. Arnold, of Norwalk, Conn., was sold to Sir Ashton Lever, while later on the «Leverian Museum» was sold and its specimens scattered among the great museums of Europe.

Early American Museums.—In this country the principal recent museums of this character were the Boston Museum and Barnum's Museum in New York, in both of which the idea of amusement predominated, the first named being a rather incongruous introduction to a theatre. Both, however, contained some really valuable specimens of natural history and Barnum was among the first to exhibit living fishes. Of a very much earlier date, and more scientific in their aims were the museums conducted by Charles and Rembrandt Peale in Baltimore and Philadelphia, the latter of which was established in 1785 and from 1822 to 1828 installed in Independence Hall. The modern "dime museum" with its exhibit of "freaks" is a survival of this phase of museum development, and the catalogues of some celebrated old collections will show that they comprised many very similar objects, as well as those of real value from a naturalist's standpoint.

Government Museums.—The final step in the establishment of public museums, the transferral of collections from private to governmental ownership, may be said to date from the founding of the British Museum in 1753. At first admission was by ticket and limited to 30 persons per day; in 1810 the museum was made accessible to the public for three days a week, and not until 1879 was it open to the public daily. The United States National Museum was only formally created in 1876, although so early as 1846 the government possessed collections which were in the custody of the Smithsonian Institution. Exploration has done so much for museums that it may almost be included among the causes that have led to their formation. The colonization of America brought to Europe many examples of new plants and animals, while the Dutch East India voyages did the same for southern Asia, and is is surprising to see how large a number of species from these regions was described by Linnæus and others so early as 1760.

In more recent times the Wilkes Exploring Expedition of 1838-42 and the government surveys for a route for the Pacific railroad had a very decided influence on the origin and growth of the United States National Museum, and there is scarcely an institution that has not been benefited in a similar way. It is but a step from expeditions in which scientific results were subordinate to practical ends to those undertaken solely for scientific purposes, and the systematic exploration of our western Territories for fossils by Yale, Princeton, and other universities, and by such institutions as the American Museum of Natural History and the Carnegie Museum, has become a matter of almost daily news. Another most important factor in the development of museums has been national or international exhibitions. These have had a direct effect in bringing together collections illustrative of natural or industrial resources, and a more indirect influence in stimulating methods of arranging and displaying such material. The London Exhibition of 1851 led to the establishment of the South Kensington (now Victoria and Albert) Museum, and the ethnological museum of the Trocadero was one of the outcomes of the Paris Exposition of 1889. Our own Centennial Exhibition was the direct cause of the erection of a building for the United States National Museum and of the founding of the Pennsylvania Museum of Art, while from the Chicago Exposition came the Field Columbian Museum and the Philadelphia Commercial Museum. Other causes play minor parts in influencing the lines of growth of museums both small and great. Thus the extensive colonial possessions of Great Britain have been largely instrumental in making the vertebrate collections of the British Museum the greatest in the world, while the museum at Leyden is not far behind owing to the former extensive commerce of Holland. In the United States the large deposits of fossil vertebrates in the West, their general accessibility, the imposing appearance of many of the specimens, and the important results to be derived from their study have given a great impetus to the formation of palæontological collections, while special attention has been given to the preparation and exhibition of this class of material. The display of fossil vertebrates in the American Museum of Natural History is unrivaled, and other notable exhibits are to be found in the Museum of Yale University, and in the Carnegie, Field Columbian, and United States National Museums.

Popular Display of Specimens.—What may be termed the popularizing of museums has but recently taken place, and while the display of objects has always been regarded as one of the functions of museums, it is a branch which has received particular attention only during the past 25 years. Originally the larger part of the specimens of birds and mammals were placed on exhibition, but it became evident that this meant the injury or even loss of many, and that the public cared little for large monotonous series of stuffed animals. At present the number of objects on exhibition is relatively small compared with those in the reserve or study series, and there is a very general effort to display at least a part of the specimens amid their natural surroundings. The influence of the private collector has probably had much to do in bringing about this change, and the British Museum, under the administration of Dr. Günther was the first of the great museums to introduce groups of birds, with their natural surroundings, as a part of its exhibition series. These were largely added to under the directorship of Sir William Flower, who took great interest in the problem of rendering museums attractive and instructive, while, following this example, the American Museum of Natural History took the lead in this direction in the United States. To the museum of Leyden, Holland, however, belongs the credit of having before this departed from the tradition that mammals must be stuffed in stiff and formal attitudes and caused some to be mounted that bore some resemblance of life. Change in the character of the exhibits has been accompanied by equal changes in the matter of labeling and to some extent in the publications issued by museums, so that from being merely storehouses of material for the benefit of a few they have become great schools of instruction for the many.

Classification.— Museums may be grouped or classified by their contents, or according to the purposes for which they were established. Following the first method Dr. Goode has divided them into museums of art, history, anthropology, natural history, technology, and commerce. A museum may be established for any of these great subjects as a whole or for one of the many branches into which they may be subdivided. Thus a museum of natural history may comprehend both animals and plants, or one or the other of these primary divisions; it may include the animals of a single continent, a single geographical region or be restricted to those of one locality; it may be devoted to some large group, as mammals, birds, or insects, to some minor division, as birds of prey, butterflies, etc., and may or may not include fossil species. Technology may be greatly subdivided, and while the favorite and more striking subjects are shipbuilding and railroads, there are also museums of hygiene and textile fabrics, while the United States National Museum contains collections illustrating the development of electrical apparatus. And technology may trespass on art in the matter of ornament, or, like art, be included in a historical collection illustrating the progress of mankind or of one nation.

According to the purposes for which they are founded Dr. Goode distinguishes national museums; local, provincial, or city museums; college and school museums; professional or class museums; and museums or cabinets for special research owned by societies or individuals. This scheme of classification is open to the objection that it confuses purpose with ownership or administration, since, for example, national and municipal museums are not merely for the display of objects found within their boundaries, but for those belonging to the nation or city.

College and school museums have for their immediate purpose the formation of collections that shall aid students in understanding various problems connected with science, technology or art, but they are usually extended beyond this and become more or less general in their character. This has been the case with the museums of Harvard and Yale universities and is notably true of many foreign museums, such as that of the Royal University of Prussia, which is the national museum. The professional museum is for the illustration of some special occupation or line of research such as mining, medicine, or even psychology, which has a museum at Florence founded by Mantegazza. The largest institution of this kind is the Museum of the Royal College of Surgeons, London, which has developed from the private collection of John Hunter.

Modern European Museums.— Europe naturally has the greatest number of governmental museums, the capital of almost every state claiming at least one museum of natural history and an art gallery, and often anthropological and technological collections as well. Paris, with some 30 museums, probably leads in the matter of national collections, while Berlin and Vienna have respectively about 20 and 15 museums. Turkey forms a notable exception to the above statement, for Friedlander's Directory contains no mention of a Turkish museum, although a commercial museum has been established at Constantinople. Great Britain has the largest number of local museums, those devoted to the preservation and display of objects illustrating the natural history and archæology of the immediate vicinity, and, as a whole, these are better administered than those of other countries, great care being devoted to labeling, arranging and otherwise making the collections interesting and instructive to the public.

Modern American Museums.— Including collections of all kinds, there are, according to a list prepared by Dr. A. G. Mayer, 343 museums in the United States, divided according to subjects as follows:

Natural history	233
Science and fine arts	13
Fine arts	34
Industrial arts	6
History	20
Art, history, archæology and ethnology	26

Many of these are, of course, extremely small and it is unfortunately only too probable that many of them are poorly supported and badly cared for, since it often happens that a college may receive an important gift of material without provision for its subsequent care. Omitting the smaller "cabinets" 176 of these museums are attached to schools or colleges, 31 are controlled by societies, 16 are private or municipal institutions and 29 have been established by the Federal government or by States. A very considerable portion of these State museums. however, are connected with agricultural colleges or geological surveys and are limited in their scope, so that the number of institutions adequately representing the resources of the respective States is very small. The State Museum of New York stands first among these, and that of Ohio is important, while the mining industries of various States are well represented.

The Museum of Comparative Zoology, Harvard University, holds the first place among college museums. It is not confined to zoology, as its name might imply, but covers the entire field of natural history. The mineralogical collection dates back to 1793 and is probably the oldest of its kind in America, while the botanical section includes the Gray Herbarium. The nucleus of the Museum of Comparative Zoology was the private cabinet of Louis Agassiz, which was purchased by subscription for $12,000 in 1852. In 1858 an allowance was made for the maintenance of the museum and in 1859 the State of Massachusetts assumed an interest in the institution, at the same time appropriating $100,000 for its increase; $71,000 was also raised by private subscription. In 1876 the State assigned its rights to Harvard College and since that time the museum has been maintained by the university, although the great increase in its collection has been principally due to the liberality of Alexander Agassiz, who has expended over $1,000,000 for that purpose. An important museum of anatomy is attached to the Harvard Medical School. The Museum of Yale University contains the Marsh collection of fossil vertebrates, comprising many types, as well as the largest collection extant of fossil footprints, while brachiopods and sponges are well represented. In other departments are a fine series of modern corals and many rare archæological specimens. The Museum of Princeton University possesses large and important collections of fossil mammals from Patagonia and our western States, a good collection of North American birds and many examples of ancient and modern art. The Museum of Archæology, University of Pennsylvania, has the best collection of Babylonian antiquities in America and is also particularly strong in American archæology; also attached to the university is the Wistar Institute of Anatomy. To Amherst College belongs the Appleton Cabinet of fossil footprints, containing the specimens described by Prof. E. Hitchcock, and the University of Kansas is rich in Cretaceous vertebrates and large North American mammals. On the Pacific coast Stanford University and the University of California both have museums; at present these are working collections, but both have art collections apart from these.

The most important, as well as oldest museums under the control of scientific societies are those of the Academy of Natural Sciences, Philadelphia, and the Boston Society of Natural

History; the first dating from 1812, the latter from 1831, although it was the successor of the Linnæan Society, founded in 1814. Each contains large collections of birds comprising many types of species described by our earlier ornithologists, such as Wilson, Bonaparte, Cassin and Lawrence. The Academy has the largest collection of mollusks in America, and one of the largest in the world, including many types of Tryon, Say and Pilsbry. These two institutions may be looked upon as the predecessors of public, scientifically arranged museums in the United States, the majority of our museums being of very recent origin.

While city or municipal museums are not numerous in this country yet the class includes some of the larger, more important museums in the United States. Most of these have been founded by private citizens but have subsequently received support from city governments either by grants of money, the allotment of land, or the construction of buildings. Chief among them and the largest municipal museum of natural history in the world, is the American Museum of Natural History, New York, incorporated in 1869 as the result of the efforts of the leading members of the New York Lyceum of Natural History whose collections had been destroyed by fire. Other noteworthy museums of this class are the Field Columbian Museum of Chicago, the Carnegie Museum, Pittsburg, and the Milwaukee Museum.

In this category, too, are to be found all the art museums in the United States, not one having been established by the National Government, or that of any State. Local museums are practically lacking in the United States; for most of the smaller museums, even, make the attempt to cover the same ground as the larger institutions when they could achieve much better results by confining their attention to the immediate vicinity. In conclusion it may be said that while public museums are not so numerous in the United States as might be expected from the size, resources and wealth of the country, the last 25 years has not only witnessed a great increase in their number but in the growth and educational efficiency of those already established. For detailed information as to museums and their administration, cases, labels and the arrangement of exhibts, consult ‘Museums Association, Report of Proceedings, etc.,’ London (1890 to 1900); since that date ‘Journal of the Museums Association’; consult Flower for the history of museums, their objects, etc.; ‘Essays on Museums and Other Subjects Connected with Natural History’ (1898). For the history of the Smithsonian Institution, United States National Museum, classification and administration of museums, ‘A Memorial of George Brown Goode.’ Report of the United States National Museum for 1897, Part II., Washington, D. C. (1901) ‘An Account of the United States National Museum’; Report of the United States National Museum for 1896, pp. 287-327, Washington, D. C. (1898). A brief history of the United States National Museum is contained in the ‘Report of the United States National Museum’ for the year ending 30 June 1901, pp. 1-47, Washington, D. C. (1903); The American Museum of Natural History is described under the title of ‘The Making of a Museum,’ by L. P. Gratacap, in the ‘Architectural Record’ for 1900, pp. 375-402.

A work in three volumes on ‘Museums, their History and their Use, with a Bibliography and List of Museums in the United Kingdom,’ by Dr. D. Murray, has just been published by James Maclehose & Sons, Glasgow.

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Mush, moosh, Asiatic Turkey, the chief town of the Mush sanjak, vilayet of Bitlis, 79 miles south of Erzerum, near the Kara-su, the eastern affluent of the Euphrates. It is built on a plateau 4,800 feet above sea-level, rising on the south side of a mountain-girt and fertile plain. It is a dirty town, peopled by Turks and Armenian Christians. It has Gregorian and Roman Catholic bishops and an American Protestant mission and schools. A thriving trade is carried on in the tobacco, grape vine, wheat, and other agricultural products of the adjacent plain. Mush is mentioned by Xenophon and Moses of Khorene, and came into prominence in 1894, owing to the massacre of Armenians at Sasun in the neighborhood. Pop. about 20,000.

Mush'room, a popular term loosely applied to many species of higher fungi, especially such as have a cap (pileus) upon an erect stalk. Primarily, the mushroom is *Agaricus campestris* (see Fungi), the only species cultivated upon a commercial scale. Though more than 700 species of mushrooms have been proved edible within the last half century, and though many others will doubtless be proved harmless, the novice should be cautious in trying new species. Each unfamiliar kind should be subjected to rigid examination first by smell, and malodorous ones discarded; then by taste, a small piece being nibbled but not swallowed. If no ill results follow in the course of several hours, a small piece may be swallowed. If no evil effects follow, but the flavor raw is unpleasant, cooked morsels may be cautiously tried, and results noted. Each individual must decide what species agree with him, because some systems will not endure kinds innocuous to others. Nervous fear of fancied bad symptoms must be controlled, or real illness may be induced by the imagination.

Several species are popularly reputed virulent which do not produce any marked effect upon the health for several hours, and which are widely feared as deadly. Since the two commonest of these (*Amanita muscaria* and *A. phalloides*) are often mistaken for the common mushroom, the novice should never gather any toadstools in the woods under the impression that they are the proper mushroom, which grows in pastures, lawns, etc., and not in shady places. Further, all species with yellow or white gills should be avoided until known to be edible. The common mushroom has pink gills when young, and purplish-brown or black gills when mature.

Several of the thousand species of the genus *Agaricus* are valued for food, but the common mushroom (*A. campestris*) is the most important. It is occasionally found in open and grassy glades; never in the deep forest, but most frequently in old pastures and lawns, especially in autumn, but often when conditions are favorable during the summer. It grows about three inches tall, has a fleshy cap about three inches broad, generally white, sometimes reddish or brownish above and pink beneath. Its stem does not rise from a cup-like base as does that of *Amanita phalloides*. It is generally gathered in the «button» stage, that is, before the cap has expanded. Among its near relatives the best known is probably the horse mushroom (*A. arvensis*) which is much larger, whiter above, lighter below, the gills being white when young, but otherwise resembling the common species. Other prized edible relatives are: *A. silvicolus*, smooth, yellowish-white, with a long stem growing in the woods; *A. rodmani*, white, short and thick-stemmed, found in hard ground, as in city streets; and *A. fabaceus*; reddish-brown and long-stemmed, with an almond flavor and odor, which grows in greenhouses and on compost heaps. This species has been successfully cultivated.

Success in mushroom growing seems to depend more upon the individual grower than upon the method, since two growers may each succeed equally with very different methods. The essentials seem to be decaying organic matter in abundance, uniform but not excessive moisture, and equable rather low temperature. The most popular places for cultivating this plant are caves, abandoned mines, and quarries, cellars, pits and similar places, where the temperature is naturally suitable or may be artificially controlled. The beds are usually made by spreading a layer of well rotted manure and loam over a firmly packed deep layer of fresh horse-manure. After the violent heat of fermentation has passed and the temperature has fallen to or below 90° F., the mushroom «spawn» is planted. This spawn consists of the mycelium of the fungus in bricks (English) or flakes (French) made of equal parts of horse and cow manure and loam; it is a commercial article and its manufacture constitutes a business distinct from mushroom growing. After sowing, the bed is kept moist by mulching with straw or covering with mats which are replaced in about ten days with a layer of loam about two inches deep. In America the mushroom is rarely cultivated out of doors; in Europe it often is, the temperature and moisture there being more favorable. It is frequently found growing wild as in the vicinity of Petrolea, Ontario, Canada, in sufficient quantities to make commercial shipments profitable.

Besides the species already mentioned, several common American species are among the most desirable edible fungi. *Coprinus comatus*, the horse-tail or shaggy-mane mushroom, grows sometimes six inches tall, has a nearly cylindrical white shaggy cap with often black scales, and white gills when young, but these turn black and liquefy with age. It is commonly found in lawns, waste places, rubbish heaps, etc., from midsummer until the coming of frost, especially after showers. *C. atramentarius*, the ink-cap, resembles the preceding in general appearance and places of growth. *C. micaceus*, the glistening coprinus, is a brownish species smaller than the preceding. It grows upon decaying wood. *Lepiota procera*, the parasol mushroom, and *L. naucina*, the smooth lepiota, grow in lawns, pastures and occasionally in gardens. They have white spores and a ring on the stems, to which the gills are usually not attached. *Cantharellus cibarius*, the chantrelle, grows about three inches tall, measures nearly as much across the cap, has an irregular top-shaped yellow or orange cap, and has much-branched gills. It grows upon the ground in woods. *Marasmius oreades*, the fairy ring, or champignon, is a small cream-colored or reddish species, which tends to grow in circles upon lawns and pastures. It is rather tough and solid, but is valued for its nutty flavor and its drying qualities. Its gills are alternately long and short. *Lactarius deliciosus* has an orange cap, an orange milky juice, and with age shows greenish tints where bruised. Several other related species are highly valued by epicures, for example, *L. volemus*, with a white sweet juice and orange cap; *L. corrugis*, a darker species, even dark brown. *Boletus edulis*, the edible pore-mushroom, has a yellowish or brownish cap, with convex tubes which change with age from white to greenish yellow. It is commonest in chestnut, pine, and oak woods during autumn. *Fistulina hepatica*, the liver-fungus, grows upon decaying wood, is stemless and of irregular form, red, succulent and fibrous. It is often called beefsteak-fungus on account of its edible qualities. *Morchella esculenta* and several relatives, popularly known as morels, are of various colors, but usually grayish or yellowish. The top somewhat resembles honeycomb, which makes them easily recognized. They delight in potash and are common where the land has been burned over or wood-ashes have been thrown; also in orchards and woods. *Lycoperdon giganteum* and other species of puffballs, which are common in pastures, are considered among the best edible fungi if used while still white. They are more or less globular in form. The species mentioned sometimes attains a diameter of several feet.

Mushrooms are often said to be equal to meat in nutritive qualities, but these statements are not warranted by analysis, which show that fresh mushrooms contain about 88 per cent of water, 3.5 per cent of protein, 6.0 per cent of nitrogen-free extract, and generally less than one per cent each of fat, fibre and ash. The protein content is therefore less than one fifth that of porterhouse steak, less than one third that of dressed codfish, and but little more than one-fourth that of hens' eggs. Indeed, according to analyses, they seem to be inferior to most vegetables. Their chief value is therefore in their flavors, which vary with individual species as much as among higher plants. They are eaten by various animals (see FUNGUS-EATERS).

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Mush'room Gnats. See FUNGUS-EATERS.

Music is the science of combining tones in melodic, rhythmic, and harmonic order, so as to excite the emotions or appeal to the intellect. For untold ages it was purely emotional. With its development as a science, in the Middle Ages, it appealed almost entirely to the intellect, this species of music culminating shortly, before 1600. At the present time that music is considered best which appeals both to mind and emotion. It is the combination and equipoise of these two factors which causes Beethoven to be considered one of the chief masters, and the music of Wagner, with all its intensity of passion, to appeal to the mental processes by its peculiar treatment of *Leit-motiven*.

Spencer and Huxley suggest imitations of nature (bird-songs, etc.) as a possible commencement of emotional music. Palæolithic man had his music, even instrumental music, as may be deduced from a primitive flute of reindeer's horn, found in a cave which was inhabited during the Stone Age. Many pre-historic horns of metal have been unearthed among the relics of the Bronze Age.

From two or three notes the scale grew into various intricate and widely differing forms. The five-toned (pentatonic) scale is the most primitive now in use among civilized nations. It was chiefly employed by the Chinese, even 4,000 years ago, but is also used in some hymns (‘There is a Happy Land’) and in many Scottish songs, such as ‘Ye Banks and Braes,’ or ‘Auld Lang Syne’.

About 600 B.C. Pythagoras (see PYTHAGORAS) established the proportions of the intervals, and Music, always an artificial and a human product, was given a natural foundation. (See MODE; INTERVAL.) It may be doubted whether harmony existed at all in the ancient world. It is absolutely certain that the Chinese, who were well advanced in the art in ancient days, and who formulated many acoustical principles before the time of Pythagoras, used melody without supporting harmonies. It is possible that the Greeks had a crude accompaniment of drone bass to some of their songs. The Scriptural music, loud and ecstatic, and of an improvisational character, is a blind alley and does not lead to modern development of any kind. The music of both the old and new Testaments was orally transmitted and is not to be traced. Ancient Rome copied the Greek music but without fully understanding it. Rome conquered Greece but could not assimilate its culture, and in the first centuries of our era the musical art was retrogressing. The influence of the Christian Church stayed the decadence and gave a new direction to the art. Ambrose (about 340–398) and Gregory (540–604), stemmed the tide of decay and rescued some part of the ancient systems or modes. The power of music in the early Christian ritual is not only shown by the praises of the Fathers of the Church, but by the fact that the Emperor Julian in 361 endeavored to found a musical conservatory in Alexandria to educate boys to sing in the pagan rites as his adversaries were singing in the Christian churches. The Roman influence now extended the Gregorian chants all over the civilized world. Boethius (475–524) had written a treatise on the Roman system which became the misty text-book of the earliest days (See BOETHIUS). In 790 Pope Adrian sent singing teachers into France with missals illustrating the Gregorian modes. An antiphonarium was left at St. Gallen which still exists and proves the earnestness of the musical mission. The music of this early period, however, is still very vague to us, since no practical notation existed. The musicians of this epoch sometimes employed alphabetical letters as notes (which could be deciphered) but more frequently a system of lines, curves, dots and dashes, called the *Neumes*, which were only to aid the memory of one who had learned the song orally, but meant nothing definite to anyone who had not thus studied it.

A step forward was made by a monk named Hucbald, in St. Amands, who improved the notation somewhat by using a staff (it is very doubtful if he invented it) and by writing certain rules regarding the union of different parts in music simultaneously. The reform seems, at first, to be a very great one, meaning nothing less than the birth of part-music, the evolution of a new science; but, when one knows that these parts were simply consecutive fifths or fourths, or other equally harsh progressions, one can only marvel that the men of the middle ages bore it so patiently. The new system was called the *Organum*, since it was often played upon the great wind instrument which had disappeared when Rome went down, and reappeared in Europe in the reigns of King Pepin and the Emperor Charlemagne.

A much greater reformer than Hucbald came upon the scene about 1000 A.D. Guido, an excellent monk of Arezzo, founded the system of sight-reading, by establishing a vocal scale on the syllables still in use. He noticed that the hymn to St. John (patron saint of singers) rose step by step from C to the following words,

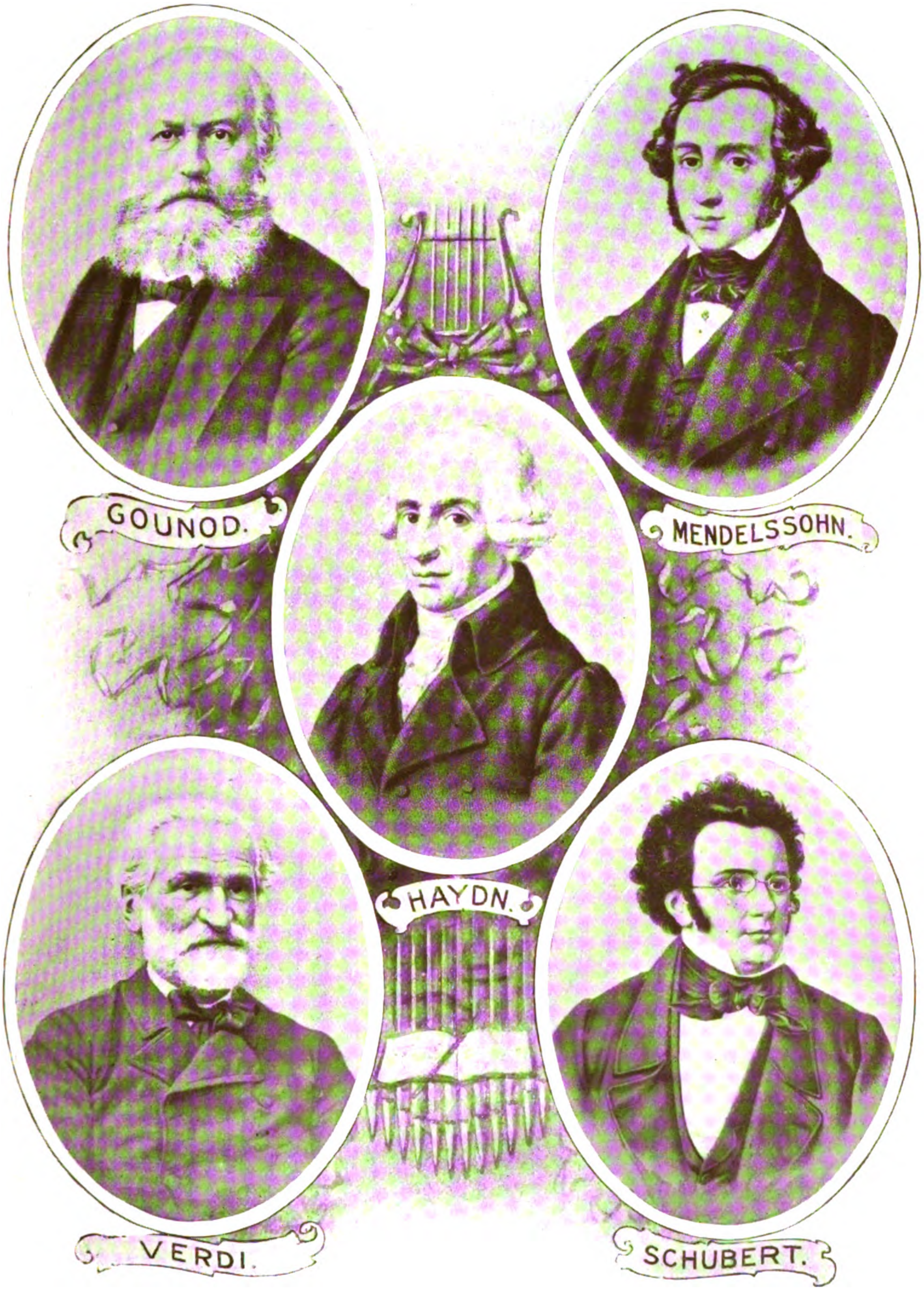
(C) UT queant laxis,
(D) REsonare fibris,
(E) MIra gestorum
(F) FAmuli tuorum.
(G) SOLve polluti
(A) LAbii reatum,
Sancte Johannes.

causing his choir-boys to memorize the syllables from the melody of their chief hymn, he soon taught them intervals by this simple means, and his treatise «De ignoto cantu» was the first practical mode of singing «an unknown song» (that is, a song unknown before to the singer), in short, the birth of sight-singing. It must be confessed, however, that Guido's claims to this tremendous discovery have been contested, and that every point connected with the rise of the science of music is more or less wrapped in vagueness and doubt.

We come to somewhat firmer ground a little later when notes of definite length are introduced. Franco of Cologne may be credited with the first clear treatise upon such a system (he calls it «Ars Cantus Mensurabilis») in the first half of the 13th century.

And now there came a recession from the evil-sounding fourths and fifths that had existed in the 10th century, and from some equally harsh progressions that were countenanced long after this. The troubadours in France and the minnesingers in Germany had brought forth secular music that broke many of the old rules yet sounded infinitely better than the more «regular» music. The musical canons of the ecclesiastics began to broaden. Marchettus of Padua and Jean de Muris, both in the middle of the 14th century, began to urge new progressions, and the consecutive fifths were tabooed, only to reappear copiously in the most modern works of the 20th century.

It will be impossible in an outline sketch to give all the attempts that were made in evolving the new science, from the 11th to the 14th centuries. Suffice it to say that out of these efforts there grew the first real school of compo-


GOUNOD.
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sition, and instead of its having birth in Rome, it was born in the Netherlands and in Flanders. Yet the Flemish school at once gave its services to the Church, and many of its greatest representatives in its earliest stages went to Rome as servants of the Catholic cause. The Flemish School may be called the true beginning of the science of music, since now, for the first time, a race of composers existed who worked according to definite rules in the production of intricate counterpoint, and were able to impart their knowledge to their pupils. William Dufay was the first of this line of composers. His epoch is mistakenly given in many histories as falling in the 14th century, but the researches of F. X. Haberl have proved that he was born shortly after 1400. He died 27 Nov. 1474 The chief of his contemporaries were Hobrecht, Eloy, Brasart and Binchois, who have, however, left little more than their names, and even of Dufay very little music is extant.

The first great teacher of the school was John Ockeghem, or Ockenheim (about 1430-1513), and among his pupils was the first great contrapuntist of that time, practically the first great composer that the world had ever possessed,—Josquin Des Pres,—whose music Martin Luther delighted in. Des Pres was born about 1440 and died either in 1515 or 1521. Other pupils of Ockeghem were De la Rue, Brumel and Agricola. All the music of the foregoing composers was purely intellectual, but with Des Pres we find the first glimmerings of emotion mingled with the musical mathematics, and he taught that dissonances could be used to express passionate feeling.

The greatest figure in the Flemish school, however, is Orlando Di Lasso (1520-94), who composed works which are beautiful even to modern ears. The Flemish school ended with this culmination. It had existed about two centuries and in that time it had brought forth the science of composition and some 300 composers.

There was, however, another country which helped greatly in this result. The first musical dictionary ever written, by John Tinctor (1476), gives the credit of the invention of counterpoint to the English, and a manuscript of a canon for six voices, in the British Museum, would seem to show that there were very skilful composers in England as early as the 13th century. This canon ("Sumer is icumen in") ascribed by some to John of Reading, in 1250, by others to a much earlier date, is a surprisingly advanced work for its epoch. A mysterious figure looms up as an English contemporary of Dufay, in John Dunstable, but of the music of this Englishman (who died about 1458) very little is known, only a few fragments remaining.

Contemporaneous with the later Flemish writers one finds a few Italian composers forming a school of their own. The first of the old Italian school was Costanza Festa, a Florentine, who died in 1545. But the one great master in this field was Palestrina (born probably in 1524—there is much doubt about the date of birth,—and died 1594), who was without doubt the greatest composer up to that time. He combined the Flemish ingenuity with a lofty dignity and sometimes (as in his 'Improperia') with emotional power.

The year 1594 was an epoch year in music. The Flemish school ended in that year, with Di Lasso's death; the Italian school lost its chief master in Palestrina; a revulsion against the intellectuality of music took place,—and the first opera was written.

We pause here, therefore, to sum up a few other points in musical evolution that had preceded this important date.

Although the chief scientific music of the world had been ecclesiastical up to this point, the troubadours in France, and the minnesingers in Germany, had turned the attention of cultured minds to the beauties of secular singing. Instrumental music was as yet a Cinderella among the arts. The strolling jongleurs and wandering minstrels amused the people, and sometimes the nobility, with displays of skill upon various instruments, combined with juggling tricks. They were generally under the ban of the law and led a very precarious existence.

One of the trouvères of France,—Adam de la Halle,—in the latter half of the 13th century, had written a musical play, entitled 'Robin et Marion,' which was the precursor of light opera. It is the earliest popular work of which we have any record, but it was written by ear, and not by any teachable rules. Venice, partly through the efforts of Flemings, partly through Italian influence, had become a centre of organ-playing. Adrian Willaert (1480-1562), a Fleming, had become organist of St. Mark's in Venice and drew many pupils thither, among them Di Rore, Zarlino, and Andrea Gabrieli. The last-named taught his nephew, Giovanni Gabrieli, who became one of the noblest composers of the Venetian school. He was born in 1557 and died in 1613. Zarlino taught many German pupils, and through the Venetian school of organ-playing, Germany for the first time came in close musical touch with Italy. Zarlino taught Scheidt, Praetorius and Schiedemann, while the elder Gabrieli had Hans Leo Hassler as a pupil. Zarlino and Willaert were the first to agitate for a tempering of the musical scale (see TEMPERAMENT), but its establishment came much later through the wisdom of Bach.

Claudio Merulo (1533-1604) established the organ toccata, probably the earliest form of technical instrumental display in the modern sense. One other form of scientific secular music had arisen, thanks to the Netherlanders; the madrigal, an unaccompanied vocal composition displaying the most intricate counterpoint had come into vogue, and Willaert and Di Lasso had achieved triumphs in this school. Luca Marenzio (1556-99) had also done good work in this field. But the most charming madrigal composers were to be found in England, where this style of singing met with especial favor. It is customary to vaunt the glory of the Elizabethan poets, but if the tremendous name of Shakespeare be eliminated, the excellence of the contrapuntists at this time rivals that of their literary brethren. Tallis, Weelkes, Wilbye, Morley, Farrant, Byrd, Bull, Ford, etc., may well be cited as balancing Beaumont, Fletcher, Massinger, Marlowe, Jonson etc.

Music-printing (see PRINTING) had also been established, in 1502, by Petrucci of Fossombrone, and caused the compositions of all these men to spread from country to country with great rapidity.

The change from the old school of pure counterpoint to a more emotional style, from intricate choral works to solos both vocal and instrumental, had its first practical demonstration in 1594 (some place the date two years later), by the composition and performance of the first opera, entitled 'Daphne.' The work was the outcome of the efforts of a coterie of cultivated amateurs who began their meetings in Florence, and endeavored to bring into music something of what they supposed it to have possessed in ancient Greece. The men who were active in this movement, which caused the renascence of music, were Giovanni Bardi (Count Vernio), Vincenzo Galilei, Strozzi, Mei, Rinuccini, Caccini, and Peri. Their first opera met with great success, but their second,—'Euridice' — was an epoch-making work, since it contained in embryo an entirely new mode of musical treatment. Counterpoint was replaced by monody, and recitative allowed musical declamation to take the place of intricate tonal construction. The libretto was the work of Rinuccini, while the music was written by Peri and Caccini in two versions, that of the former being the better.

The new school spread quickly to all countries, only in France its progress was checked by the power of Lulli, who devoted himself chiefly to ballet-music. The latter was largely introduced into Molière's plays and obtained the favor of Louis XIV., who sometimes appeared himself in the dances.

The opera was not the only form of the period of phenomenal musical activity which marked the closing of the 16th century and the beginning of the 17th. The oratorio also had its beginning in this wonderful era. Filippo Neri (1515-95), who has since been canonized by the church, was an enthusiast in the matter of good church music and at his church in Rome he frequently had spiritual meetings, apart from the regular services, in which he portrayed Scriptural subjects in the shape of musical plays. His friend Palestrina often assisted in this pious work, and may have had a hand in the development of the great sacred form. As these entertainment did not take place in the body of the church, but in the Oratory (Oratorio), the origin of the name of this form will readily be seen.

But the real establishment of the form came with Emilio del Cavaliere (1550-98), who wrote a large work in the new style, entitled 'L'Anima e Corpo.' This was first performed in 1600, probably in the church where Neri had labored, and was given upon a stage, with costume and action, exactly as if it were an opera. Although both Neri and Cavaliere were dead, such minute directions were left regarding the mode of presenting the work that one may presume that the intentions of the composer were thoroughly carried out. This first oratorio was so entirely in the new school of monody and declamation that one may doubt as to whether the establishment of opera is not in a large degree to be credited to Del Cavaliere.

Besides the opera and oratorio, instrumental forms were established at this time as well. Dancing is the mother of instrumental form. The dances of Spain had gradually made their way into France and exerted a strong influence upon classical music. In an effort to obtain contrasts several of these were joined together in one large composition, which was at first called a partita, but afterward became a suite.

Free instrumental forms also sprang from the organ toccatas already alluded to. Frescobaldi (1588-1653) was to Rome what Willaert had been to Venice half a century before. Frescobaldi has been called the father of true organ-playing. He improved the toccata and called it *sonata* (a sounding-piece,— that is, an instrumental piece), to distinguish it from the *cantata*, — the singing piece. Corelli (1653-1713) gave to the old sonata a form, which, although much less important than the later, classical shape, had yet within itself the elements of the noble form. Its first movement was a large three-division shape, exposition, development and recapitulation; and this led to the *Sonata-Allegro*, the first movement-form of the classical symphonies and sonatas, the form of many noble overtures.

Amid all these remarkable advances the fugue remained rigid and lifeless, a survival of the old intellectual problem-music. As yet the fugue was little more than a canon, a continuous imitation of a given melody. It waited its liberator — Bach.

During the century which followed we find Italy combining contrapuntal skill with the less educated enthusiasm which marked the early operas, and such men as Monteverde (1568-1643) and eventually Alessandro Scarlatti (1659-1725) make of the new school something far better than its founders had dreamed of. Stradella, Carissimi, Lotti, and Rossi added to the advance of the great new school which was to cause Italy to be just called the «Mother of Music.» The school was established in England too by Henry Purcell (1658-95), who even introduced the Italian musical signs and expression-marks into his native country. Purcell, who was the greatest musical genius that England ever produced, founded his own English operas upon the Italian models, but his works had characteristics entirely their own and extend all the way from the melody of 'Lilliburlero' (the revolutionary song of 1688) to the loftiest anthems and brightest operas.

In France the great Lulli (1633-87) was bringing forth the most dainty and graceful ballets. In Germany Reinhard Keiser (1673-1739) began the 18th century by endeavoring to form a German school of opera, but the Italian operas soon resumed their sway.

In Germany, also, the effect of the numerous students who had gone down to Venice in the 16th century and the beginning of the 17th, was beginning to make itself felt. Luther's influence had established the chorale as a sturdy root whence much sacred music was to grow. Perhaps the three men who most helped the growth of Germany's sacred music in its earliest post-Lutheran stages were the «three Ss,»— Schutz (1585-1672), Scheidt (1587-1654), and Schein (1586-1630), who not only helped Italian music in the Fatherland, but elevated the style of organ-playing far above anything that Italy had done. Musical settings of the Passion began to appear in Germany, and the oratorio took a nobler path than in Italy, even before the appearance of Bach and Handel. To Germany also was due the new arrangement of part music, which took the melody out of the tenor voice, where it had always been in the Flemish and old Italian music, and placed it in the soprano, a change due to the chorale-singing of the 16th and 17th centuries.

Out of the great musical epoch at the beginning of the 17th century there came also a radical change of notation. The notation of Franco of Cologne had been improved by the invention of many additional rhythms and the employment of smaller notes. In the music of Palestrina and of Orlando di Lasso, that is to say up to 1594, one finds some half-dozen tonalities (keys) employed, and notes and rests down to 16ths. But one does not yet discover a rational division of music into measures. This great advance came shortly after 1600, with the new monody, the declamatory music of the early operas, and with this came also, for the first time, the use of terms of tempo and of expression. Even the grouping of notes was invented in the latter part of the 17th century, so that this epoch saw the establishment of the greater part of our present notation system. Music of the better class, printed after 1700, is without any very important difference from that printed to-day.

And now the procession of the tone-masters who are prized by the modern world begins. Bach (1685–1750) and Handel (1685–1759) were so exactly contemporaneous that many speak of them as if they had been the Siamese twins of music. Yet their influence was very divergent. Bach leaned toward the old school of pure counterpoint; Handel was impelled toward modern dramatic effects. They faced different ways. Handel led toward orchestral experiments and was more directly melodic than Bach. We owe to him the noblest form of oratorio, which, by the way, he did not attempt seriously until past his fiftieth year.

To Bach we owe debts far more varied and even greater. He reconciled the old diatonic style of composition with the newer more modulatory school; by his great organ works and his clavichord fugues he founded modern technique; he was the father of the best school of organ-playing; he composed the greatest mass (that in B minor) which the world possesses, and also the noblest Passion music; and he was absolutely the inventor of freedom of modulation. Before his time, by what was called «mean temperament,» it was possible to modulate into some three or four major and minor keys. Bach in 1722 gave to the world the first book of his «Well-tempered Clavichord,» the composer's declaration of independence — «We hold that all keys are created free and equal!» (See TEMPERAMENT.) In 1740 he wrote the second book, riveting the great reform.

Opera in the meantime had lost its opening splendor. Intoxicated by the success of the new style of music the composers began to believe that poetry was a secondary matter in the wedding of the arts, and in allowing their music to pursue an independent path all dramatic purport was soon lost. A reformer was needed and he soon came. Gluck (1714–87) began a crusade against the meaningless character of many of the beautiful melodies of the Italian Opera. In 1776 his opera of 'Orpheus' (which still holds the stage) began the dramatic school of operatic music. Beethoven followed in this path, and Mozart managed to reconcile melodic grace and dramatic content.

In carrying this sketch to its conclusion we must now trace three intertwining paths — piano music, orchestral music, and operatic and other vocal music. Naturally we shall be able to allude only to epoch-making composers.

In 1709 Cristofori, an Italian, invented the pianoforte. The instrument was at first neglected. Bach thought it fit only for rondos. Mozart used the spinet, as did Haydn. It was Beethoven who first turned the tide toward the new instrument. Instrumental technique grew up in the train of the new invention. Domenico Scarlatti (1683–1757) led toward a piano style while writing for the spinet. In 1752 Philipp Em. Bach published the first valuable book of technique, which could be applied to the piano, to the clavichord, or the spinet.

The classical piano sonata grew gradually from a combination of the ideas of the suite and of the first movement of the old sonata as established by Corelli. Haydn first established it, Mozart improved it, and Beethoven brought it to its culmination. The symphony was but a larger form of sonata, for orchestra, and the same process of evolution took place. Seldom has a form reached its zenith more quickly; from the first symphony, composed by Haydn (in three movements and for eight instruments only) in 1769, to the tremendous ninth symphony of Beethoven, composed in 1824, is but 55 years, yet these years contain all that is pertinent to the birth, growth and climax of every form of sonata,— in which we include classical chamber music, string quartettes, quintettes, etc., and orchestral works such as symphonies and concertos.

Just as there was a most significant musical epoch from about 1590 to 1620, so we find the «classical period», from about 1775 to 1825 to present not only a marvelous amount of creative energy, but a change in the musical taste of the world, a transformation of the scope and style of music. Only the opera went on its uninterrupted path. Yet here, too, there were some changes.

Beethoven (1770–1827) was an instrumental, an orchestral composer, par excellence. His one opera, 'Fidelio,' great art-work though it was, exerted no especial influence upon any school of composition. Mozart (1756–91) improved the style of the Italians in opera, but did not actually strike out a new path. His 'Don Giovanni,' for a long time the masterpiece of the world in the operatic form, was but a culmination of what Italy had already attempted. Rossini (1792–1868) with a pernicious habit of creating the most beautiful melodies whether they fitted the text or not, set back the hands of the clock of musical progress, as far as opera was concerned, for a good half-century.

The first ringing note of the newer and truer school of dramatic opera was heard when Von Weber (1786–1826) in 1820 completed his 'Freischütz,' an opera built upon the sure foundation of the folk-song, a dramatic work, thoroughly wedding its poetry and music.

The sacred forms, during the classical epoch, did not change materially. Beethoven wrote a most intricate mass, but it was only an echo of Bach with his great polyphonic B minor mass. Mozart composed, almost upon his death-bed, a noble requiem, but it was only an addition of operatic flavor to the requiems that had preceded. Cherubini (1760–1842) wrote a couple of requiems that were as great as any of the school — but were not in any sense innovations.

Piano and orchestral works advanced the most in the classical half-century. The vastest piano-work existing today is probably Beethoven's B flat sonata, Op. 106.

The orchestra, in the modern sense, had its birth in the classical half-century. Bach and Handel made only outline sketches of their orchestral works, leaving much for modern commentators to fill in. But when Haydn came to England, in 1791, he directed a complete orchestra and he published complete orchestral scores, an epoch in the history of orchestral development. Mozart had, however, before this time, written a large number of symphonies in complete score, many of which were published at a later period. Although the modern orchestra and the full score had their origin in this remarkable epoch, the art of conducting came later. Mendelssohn and Berlioz may be named as the first really great conductors in the modern definition of the word. The use of the baton in conducting only became established after 1800.

One other important evolution must be added to the work of the 50 years which form such a golden epoch of musical creation. The songs of Europe, such as had any real worth, were almost altogether folk-songs, melodies which grew up as the briar rose by the way-side of art, not the careful product of great composers, but the spontaneous voice of the people. The songs of the composers were generally dull and artificial things, made so, perhaps, by the fact that the poets were not concerning themselves with short and lyrical forms. But when Goethe and Heine, in Germany, began writing beautiful lyrical poems, the song-composer was sure to follow soon. Franz Schubert (1797–1828) was the genius who evolved the ‘Lied,’ the artistic song which, however short, was yet a complete and perfect whole; as a tiny Meissonier painting is as perfect in its way as the largest canvas. Schubert added glorious works to the symphonic repertoire, his piano-works practically founded the “Minuet-form,” yet he thought vocally, and his most spontaneous and most important works we consider to be his ‘Lieder,’ which songs began a new school. There are, however, a few authorities who consider Schubert greatest in his orchestral works and influence.

We may now follow the three distinct musical paths,—Vocal forms (including opera), piano music and orchestral music,—each by itself, to the present time. Continuing the song development, we find Schumann (1810–56), and Robert Franz (1815–92) following in the footsteps of Schubert and bringing the miniature vocal form to perfection. The operatic form took a wide deviation.

The work of Rossini was baleful only in the fact that it paid no heed to the wedding of words and music in dramatic unity. In light operas Rossini was a model, and his ‘Barber of Seville’ is a masterpiece. Once, and once only, he proved that he could write a truly dramatic opera, and produced ‘William Tell.’ Donizetti (1797–1848), Bellini (1802–35), and others, followed his lead and wrote charmingly, but untruthfully. France compromised and united prettiness and some degree of dramatic feeling in the works of Gounod (1818–93), and of Ambroise Thomas (1811–96). The real reform, however, in this *mésalliance* of Poetry and Music was made by Richard Wagner (1813–83).

Wagner's combat and triumph have been too recent to require detail here. We need only state that his theories of opera, or “music-drama” as he preferred to call it, were,—

1. The abolition of a set form (that is, ending as one began), and the use of any shape that the poem suggested.
2. Absolute unity of the entire work. No division into songs, duets, choruses, with applause between and sometimes even encores. Continuity from beginning to end.
3. The music is always to interpret the poetry. Its entire character is to be dictated by the words: “Music is Truth.” “In the wedding of the arts Poetry is the man, Music the woman”; “Poetry must lead, Music must follow”; “Music is the handmaid of Poetry”; are a few of Wagner's apothegms.
4. Abolition of mere tune and the substitution of a melodic recitative, called the “Melos.”
5. Absolute freedom of modulation. Not necessarily a fixed tonality to any work or part of it. “Swimming in a sea of tone.”
6. Excellence of libretto. No book is fit to be used for the text of an opera unless it would make a successful drama by itself.
7. A constant use of the Leit-motif (a musical figure expressing a definite meaning) by which the orchestra speaks a language that can be comprehended, somewhat like the chorus used to do in the old Greek tragedies. (See LEIT-MOTIF.)

These are not all of the theories that Wagner evolved, but they are the most important. They did not spring into being at once. One sees a few of them in ‘Tannhäuser,’ more in ‘Lohengrin,’ but the fulness of his reforms is first revealed in ‘Tristan und Isolde.’

Wagner's work has influenced all the modern opera composers. Verdi (1813–1901) had begun his career in Italy almost upon the lines of his predecessors. Thanks to his genius he soon began to carve out a better vein for himself. In his ‘Aida’ he began to lead Italy to a much finer and truer school of opera than it had ever possessed. In ‘Otello’ and ‘Falstaff’ while carefully discarding the “Leit-motif” he seems to arrive at almost all the other Wagnerian conclusions, although his Italian personality prevents any great resemblance in results. In France, Bizet (1838–75), the best of French operatic composers, was starting upon a similar path with ‘Carmen’ when death interrupted his career. America has as yet produced no standard operas, although Paine's ‘Azara’ and Chadwick's ‘Judith’ are worthy to become permanent additions to the repertoire.

Tracing the piano path from the time of Beethoven, we find three great “Cs” in technical writing — Czerny (1791–1857), Clementi (1752–1832), and Cramer (1771–1858). These led to a modern technique and this bore fruit in two different directions. Liszt (1811–86) became the king of the piano and brought its technical power to a point that had never been suspected before his time. Chopin (1809–49) came as the poet of the piano and gave to the instrument its most beautiful phases of expression. A host of piano composers have sprung up in every civilized country, Russia furnishing a great number.

In connection with the rise of technique we may speak of the advance in other branches of music. Italy had great singing schools in the 18th century, and some of the most famous vocal teachers. Nicolo Porpora (1686–1766) was the most eminent of these, and had as pupils some of the most renowned singers of his day, among them Farinelli (Carlo Broschi) who was reputed to be unrivaled in flexibility and in power. Pistocchi was another of the famous teachers of this epoch and his most famous pupil,—Senesino,—disputed the palm even with

Farinelli, in England in Handel's time. Vocal technique could scarcely go further than it advanced in the 18th century, although the 19th furnished such singers as Catalani, Malibran, Mario, Rubini, Lablache, Jenny Lind, and later such artists as Jean De Reszke, Adelina Patti, and, in the dramatic school, Materna, Tietjens, etc.

In violin technique the chief advance was begun in the 17th century, when Corelli (1653–1713) was the most prominent teacher of Italy. At about this time, too, the golden period of violin making began and the Amatis, Stradivarius and the Guarnerii made the name of Cremona famous all over the world. The king of all violinists, speaking entirely from the standpoint of virtuosity, was Paganini (1784–1840) who advanced technique so far that even to-day the greatest living violinists are unable to conquer all of the difficulties which he left as a legacy to the world. Since his time the sceptre has passed to Joachim (1831—), who held it for many years, but now, in his old age, sees it contended for by a host of advanced players. Paganini influenced violin music toward mere virtuosity, while such players as Joachim, Wilhelmj, or Wieniawski combine musical feeling with technique in their work.

Orchestral advance has been absolutely phenomenal since Beethoven made his developments in tone-coloring. Berlioz (1803–69) was the first to improve upon the great pioneer's work and achieved remarkable results by his various experiments with new combinations. Wagner carried the art of orchestration still higher in his operas, and since his death a whole host of great tone-colorists have arisen. Russia has contributed very much to this advance, and it is not an absurd prophecy to predict that the Slav may attain the orchestral supremacy of the world in the near future. Tschaikowsky (1840–93) appears to be the greatest genius in this field that Russia has yet produced.

France has done much in recent times in this direction both in purely orchestral works and in combination with voices in cantatas and operas. César Franck (1822–90) led the reform in that country and, thanks chiefly to him, a race of very modern music-thinkers has arisen in France. Massenet, Saint Saens, D'Indy, Charpentier, Chaminade, and many others are writing in various fields of music, almost all tending to develop the orchestral side in some way. There is much freedom of form in the neo-Gallic school.

Italy has done very little in this direction, Sgambati being her only symphonist of prominence, but the neo-Italians, Mascagni, Puccini, Leoncavallo, etc., are laying great stress upon their orchestral work in opera.

Germany has developed chiefly along the Wagnerian lines, not an unmixed blessing when applied to purely orchestral work. After Beethoven there came a degree of dulness in orchestral matters. Mendelssohn (1809–47) developed the symphony along the classical lines, but while one must pay cordial tribute to the symmetry, skill, and melodic character of Mendelssohn's work, he was not of the stuff of which epoch men are made.

It was Schumann who made the first remonstrance against following too slavishly the classical paths, and through him the Romantic school and the freer mode of sonata treatment had its birth.

There are many who desire us to believe that the sonata form and all classical orchestral forms have had their day, but the great work of Brahms (1833–97) in symphony and sonata stands as a refutation to this dictum.

Nevertheless the modern tendency is toward greater freedom than ever before, both in form and in harmonic combinations. Liszt began this movement, and the time will come when it will be seen that his orchestral works were scarcely less influential than his piano compositions. He has led toward great brilliancy of tone-coloring, and, in his 'Poèmes Symphoniques,' to freedom of form and to intense dramatic expression. In England, Edward William Elgar (1857) has broken the bonds of Handelian tradition in oratorio by his Wagnerian orchestral, solo, and choral treatment of 'The Dream of Gerontius' and other sacred cantatas. Richard Strauss (1864—) has led the orchestra into the most difficult paths that it has ever trodden. He is not only the greatest master of orchestration at the present time, but he has endeavored to extend the boundaries of orchestral expression, using metaphysical subjects freely and pushing programme-music (instrumental music which gives definite pictures) to the extreme limit.

America has brought forth a school of orchestral writers of which John K. Paine (1839—), George W. Chadwick (1854), and E. A. MacDowell (1861—), are the foremost, while Horatio Parker (1863—) has brought the American oratorio to a much higher standard than it has ever before occupied.

What the future may bring is difficult to prophesy. Music has changed so constantly and so entirely, from epoch to epoch, that it is folly to imagine that there will be no further changes. In 1722 Rameau, the French composer, declared that music had been worn utterly threadbare, that all the possibilities of tonal expression had been exhausted! Yet almost all the great composers came after that time!

We cannot believe that the world will ever recede from the great orchestral virtuosity it has attained, but we may imagine that a return may be made, if not to form, at least to melodic beauty. A combination of attractive melody with rich and impressive harmony, a perfect balance of the intellectual and the emotional sides of the art,— these may be characteristics of the Music of the Future.

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Music-Box, See MUSICAL INSTRUMENTS, MECHANICAL.

Musical Drama. See DRAMA; MUSIC.

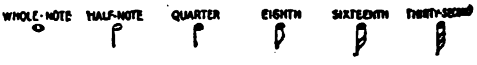
Musical Elements and Terms. Music is the science or art which treats of tones produced by the mathematically regular vibrations of resonant bodies, in contradistinction to a confusion of irregular vibrations created by noise or a jumble of sounds.

Modern music, therefore, considered on its technical side, depends upon a perfected system of mathematics and acoustics, evolved through centuries of gradual development, an evolution sketched in the historical and descriptive article on MUSIC in this work, to which refer.

By its manipulation of space and time in the process of development, the whole science of music has resolved itself into the mathematical measurement, combination, and distribution of sound waves. Tones, considered simply as to their duration, are magnitudes of time, which stand in a descending geometrical progression the exponent of which is 2 : 1, 1/2, 1/4, 1/8, 1/16, 1/32, etc. The time is expressible in fractions (2/2, 3/2, 4/4, 3/4, 4/8, 6/4, 6/8, etc., time), which indicate in numbers how many parts of time (𝅝) are contained in each bar. In space, tones can be considered as magnitudes of sound, and their distances from each other in the scale are expressed in numbers, which have reference to a mathematical division of the space between two sounds, adopted as limits (the octave, the third, seventh, etc.). Similar proportions exist between the various voices, the soprano or treble, bass, etc., and between the various keys. In instrumental music, the depth and height of the tones depend upon the proportions of the thickness, length and lightness of the chords, the quality, diameter and distance of the openings in wind instruments and the like; and all these proportions are determined and measured according to mathematical rules. Middle C, shown in the scale farther on, has about 132 vibrations to the second, and is produced by sound waves from eight to nine feet apart. Waves at half that distance apart, produce a tone one octave higher, half that again the next higher octave, and so on. In large organs C four octaves below middle C with 16½ vibrations per second, is reached, but the effect is imperfect. The piano reaches a4 with 3,520 vibrations per second, and sometimes c5, with 4,224 vibrations. The highest note taken in the orchestra is probably a5, on the piccolo, with 4,752 vibrations. The practical range in music is from 40 to 4,000 vibrations per second, embracing seven octaves. The human ear is, however, able to compass eleven octaves, that is, notes vibrations ranging from 16½ up to 38,000 in a single second of time.

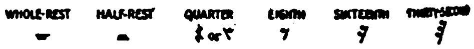
As may be gathered from the preceding paragraphs, the simplest form of musical sound is the Tone, distinguished by the three properties of *length, pitch* and *power.* These three properties constitute the elemental departments of music: RHYTHMICS, treating of the length of tones, the structure of phrases, sections, and periods; MELODICS, treating of the pitch and succession of tones; and DYNAMICS, treating of the power or force of tones, and the manner or form of delivery.

Tones are represented by characters called Notes, named by some nations, including the English speaking races, after the first letters of the alphabet, A, B, C, D, E, F, G; and, by Latin nations generally after syllables, as Do, Re, Mi, Fa, Sol, La, Si. Notes by their positions on the Staff of five lines give the pitch of the tones, and indicate their length by their form. The notes in common use are the



the names indicating the relative length of their tones. In modern music, the Whole-note, occupying all of an allotted amount of time, is regarded as the unit, although a character representing a tone twice as long as the Whole-note, and called a Breve or Double-note (▣) is sometimes used.

Rests,— characters used to indicate silence,— correspond in length of time to the notes which they represent, as indicated by their names:



A Dot placed after a note or rest increases the duration of either by one-half; two Dots increase by three-fourths, the second dot adding one-half the length of the first.

A curved line (⌒), called a Tie or Bind, placed over or under two notes of the same pitch indicates that they represent a single tone equal to their united lengths; the curved line drawn over two or more notes which differ in pitch, is called a Slur, and indicates that these notes are to be sung or played legato, that is, smoothly and fluently.

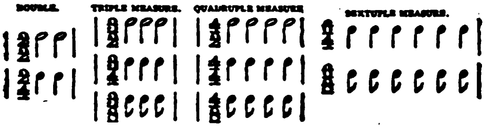
The Pause (𝄐) or Hold is placed over or under a note and indicates a prolongation of the sound according to the judgment of the performer.

Three equal notes may have their length diminished or reduced by placing the figure 3 above or below them; so marked they are termed Triplets, and their length equals two of the same kind.

To facilitate interpretation and performance, musical compositions are divided into short sections of equal duration called Measures and Parts — into measures by single bars and into parts by double bars. If a part is to be repeated, dots, called Repeating Dots, precede the double bar. (See characters at end of article.)

The regular succession of these parts is called Meter, and this mathematical division of sounds by means of measures, metrical divisions and notes, is called Time. The time of each measure is the same as that of every other measure in the part and is determined by two figures, in the form of a fraction placed at the beginning of the piece, or at the beginning of a part. The Numerator of the fraction indicates the number of beat counts into which the measure is divided; the Denominator indicates the form of note which will represent the beat. Thus $^6/_8$ shows that there are six beat counts in the measure and that an eighth-note will fill each beat.

According to the division of the Measure into parts, it is respectively called Double, Triple, Quadruple, or Sextuple measure. Each kind of measure may have several varieties, according with the length of the notes expressed by the denominator of the fraction. For example:—



Accent — the life of Rhythm — is a stress given to certain parts of the measure. In Double and Triple measures, the first part is accented; in Quadruple measure, the first and third parts; in Sextuple measure, the first and fourth parts. In measures containing two accents, the first is the principal and stronger.

Rhythm, defined in its broadest application, is the swing and sweep of a musical composition, emphasized by the accents ringing out in their proper places, and attaining a series of climaxes in the special stress given to each metrical division of the work.

A Syncopated Note is one that begins on an unaccented part of a measure and continues on an unaccented part giving a not unpleasant hiatus or jump to the rhythm.

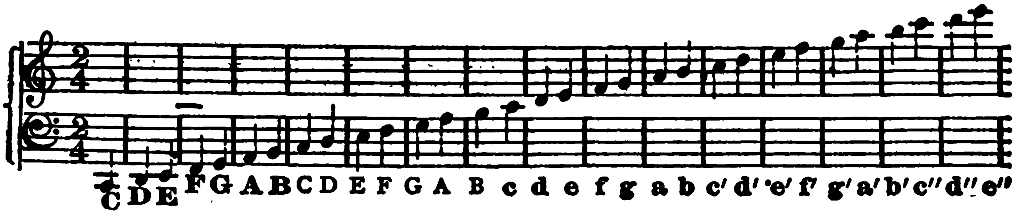
The length of the beats in each measure is indicated by certain Italian words, the chief of which are: adagio, allegretto, allegro, andante, andantino, largo, larghetto, lento, moderato, presto, prestissimo, the definitions of which will be found in the table of musical terms incorporated with this article.

In the elemental department of MELODICS, the staff is used to represent the relative position and pitch of tones. The staff consists of five lines and four spaces, each line and space being called a degree. Added lines, called Ledger or Leger lines, are used to represent tones which are too high or too low to be represented upon the staff. They may be placed above and below the staff to any extent desired, as they are simply a continuation of the staff, the note immediately above or below the staff being in a space. The lines and spaces of the staff are named from the lowest upwards, 1st line, 1st space, etc., the added lines and spaces above or below also being respectively enumerated 1st line above or 1st line below, etc.

Each degree or line and space, is designated by one of the first seven letters of the alphabet, determined by the character of the Clef. The Clef is the character placed at the beginning of the staff to show how the letters are to be applied. The Clefs in common use are the G or treble clef marking the position of G on the second line of the staff, and the F or bass clef marking the position of F on the fourth line of the staff. In four-part songs, the soprano and alto are written in the treble, and the tenor and bass in the bass clef. The C on the first line below the treble staff, and the first C on the first line above the bass represent the same tone which is known as Middle C.

The staff as here represented embraces the compass of every singing voice, and extends over a range of 31 notes, or four and a quarter octaves.

Voices are usually considered under three divisions for the male: bass, baritone, and tenor; and four for the female sex, contralto, alto, mezzo-soprano, and soprano. The usual range of the bass is from E below the bass clef (phenomenal voices sometimes descending to lowest C) ascending two octaves to f; baritone from G on first line of bass clef, two octaves


C D E F G A B C D E F G A B c d e f g a b c' d' e' f' g' a' b' c'' d'' e''

to g; tenor, from C, two octaves to c′; contralto, the deepest female voice, from F to c″, or two and one-half octaves; alto, two octaves, from F to f; mezzo-soprano, from A to a′; and soprano from c (middle C) two octaves to c″, which is also indicated as c^2. Following natural and mathematical laws the tones of the female voice are an octave higher than those of the male, therefore a soprano solo sung by a tenor is rendered an octave lower than the notes in which it is written.

Besides the treble and bass clefs, others are used by certain orchestral instruments, as the alto clef for the viola, marking the position of C on the third line, and the tenor clef used for the trombone and marking the position of C on the fourth line.

The different vocal and instrumental parts are commonly represented by two or more staves, united by a Brace, and called a Score.

The Absolute Pitch of Tones, that is the pitch independent of scale relationship, is designated by the letters naming the degrees of the staff; as A, B, C, D, E, F, G. The position of these letters is fixed and unchangeable while the clef remains unchanged.

The difference of pitch between any two tones, as from A to B, from A to E, from C to G., etc., is called an Interval, and in the regular succession of the natural tones, there are two kinds of intervals, larger and smaller. The larger intervals are called Tones and the smaller semi-tones. In the major scale the semi-tones occur between the third and fourth notes and between the seventh and eighth notes, the other five notes of the scale representing each a tone. These two half-tones in the octave afford infinite variety in music. Were the eight natural sounds in the octave equidistant one from another, there being no semi-tones, the keys would differ only in acuteness and not in quality, as now. Between any two tones of the staff having the interval of a step, another tone may be inserted, dividing the step into two half-steps. These inserted tones are represented on the degrees of the staff by the aid of characters called Sharps and Flats. Thus, a tone inserted between C and D, is named C sharp, or D flat.

A Sharp, ♯, placed on a degree, raises the pitch of a tone a half-step; a Flat, ♭, placed on it, lowers the pitch of a tone a half-step below that named by the letter. The power of a sharp or a flat may be cancelled by a character called a Natural, ♮. A Double Sharp, 𝄪 is used on a degree affected by a sharp, to represent a tone a half-step above the one affected by the sharp; its power may be cancelled by a sharp and natural, ♯♮. A Double Flat, ♭♭, is used on a degree affected by a flat, to represent a tone a half-step below the one affected by a flat; it may be cancelled by a flat and natural ♭♮.

The Signature of a Staff is the part between the clef and the fraction; it is named from the number of sharps or flats which it contains, and indicates the key in which the composition is to be sung or performed. If there is no signature, the key is that of C or its relative minor A, and the notes correspond with the white keys of piano or organ. A sharp or flat in the signature applies not only to the degree on which it stands, but also to all others which represent the same pitch. A sharp, a flat, or a natural, placed outside the signature, is called an Accidental, as appearing accidentally in the measure, and applies only to the degree on which it stands. If not cancelled, its influence extends no farther than the measure in which it appears, except when the last note of a measure is flat or sharp, and the first note of the following measure is the same letter; then, if it is syncopated, the influence of the accidental extends to that note.

The Relative Pitch of Tones is indicated by a Scale, or Tone Ladder. The Diatonic Scale, generally called the Scale, consists of a regular succession of intervals from the key-note to the octave, 1st, 2d, 3d, 4th, 5th, 6th, 7th, 8th or octave, by a compromise called Temperament, it having been found most agreeable to join to the seven sounds of one group, the first of the next higher, making eight in all. The key-note is the first note in the scale. This scale is also called the Major scale to distinguish it from another scale, having its semi-tones in different order, and called the Minor scale. In the compass of the scale there are five whole tones or degrees, and two semi-tones or half-degrees. Commencing on C, that is making C one of the scale, these semi-tones are found between the third and fourth and seventh and eighth degrees, and between the first and third degrees are found two whole tones, marking the distinctive feature of the «Major» or greater third. All music written on the scale when so constructed is said to be in the major keys; and this scale can only be formed from notes following this natural order. There is, however, another series of notes, equally well-fitted for expressing musical ideas, which is formed by commencing on A instead of C or the equivalent note of any other Major key-tone. In this scale the semi-tones always fall between two and three and five and six, between the first and third degrees, there being not two whole tones, but only a tone and a half, making the «minor» or lesser third. All music written on a scale so constructed is said to be in the minor key, and is often most impressive. The Minor scale has various forms. In the Natural form as already shown, the half-steps occur between two and three, and five and six, and is formed from the Major Scale, by taking the last two notes above and placing them below. The Harmonic form differs from the Natural form by the introduction of sharp-seven. The Melodic form in ascending has sharp-six and sharp-seven, while it usually descends by the Natural form. The Minor scale, based upon six of the Major scale, is called its relative minor; and the Major scale, based upon three of the Minor scale, is called its relative major. The signature of a minor piece of music is the same as its relative major, the additional sharps or flats being introduced before the proper notes in the piece. Thus, a minor piece in the key of E has the signature of G major, that is F♯; and D♭ is used instead of D.

The key-note is One of the scale, and is called the Tonic. As already explained a minor third above the tonic characterizes the Minor scale; a major third, the Major. The Fifth of the scale is the Dominant; the Fourth, the Sub-Dominant. The key of a piece of music is the fundamental tone, or one of the scale in which it is written, and is indicated by the signature. The key of C has no signature. The other key signatures are: G, one sharp — F♯; D, two sharps — F♯, C♯; A, three sharps — F♯, C♯, G♯; E, four sharps — F♯, C♯, G♯, D♯; B, five sharps — F♯, C♯, G♯, D♯, A♯; F♯, six sharps — F♯, C♯, G♯, D♯, A♯, E♯; F, one flat — B♭; B♭, two flats — B♭, E♭; E♭, three flats — B♭, E♭, A♭; A♭, four flats — B♭, E♭, A♭, D♭; D♭, five flats — B♭, E♭, A♭, D♭, G♭; G♭, six flats — B♭, E♭, A♭, D♭, G♭, C♭. Notice that beginning with C the dominant or fifth note of each scale forms the tonic or key-note of the next scale, and thus interweaves the eleven scales into a completed circle.

An interval is the difference of pitch between any two notes in the scale. Unisons are of the same pitch. A major second consists of a step; a minor second of a half-step. A major third consists of two steps; a minor third of a step and a half-step. A perfect fourth consists of two steps and a half-step; an augmented fourth of three steps. A perfect fifth consists of three steps and a half-step; a diminished fifth of two steps and two half-steps. A perfect sixth consists of four steps and a half-step; a diminished sixth of three steps and two half-steps. A major seventh consists of five steps and a half-step; a minor seventh of four steps and two half-steps. A perfect octave consists of five steps and two half-steps. These are called diatonic intervals, as they are all found in the diatonic scale. Other intervals, called chromatic intervals, may be formed by the use of sharps and flats. When the lower note of the two representing an interval is placed an octave higher, or the upper one an octave lower, the interval is said to be inverted. The degrees of an interval are counted upward, unless the opposite is stated; and the degrees occupied by the notes, as well as the ones between them, are counted.

The Chromatic Scale is a regular succession of semi-tones, the tones named from those of the diatonic scale or the letters of the staff, the intermediate ones taking their names from one or the other of the tones between which they occur, with the addition of the word "sharp" or "flat". Thus the tone inserted between C and D, when named with respect to absolute pitch, is called C sharp or D flat; and with respect to relative pitch is called sharp one or flat two.

Passing Tones not essentially belonging to a melody, are often introduced, and are usually represented by small notes.

A Chord is a pleasing combination of tones sounded together, and Harmony (q.v.) is a succession of chords, according to the rules of progression and modulation.

Dynamics or the power of tones and the manner or form of their delivery, constitute the third elemental department of music. The power of tones is usually indicated by words, marks of expression, characters and abbreviations, mostly of Italian origin, affixed in the positions desired on the composition by composer, editor, or technical interpreter.

The following alphabetical table includes the dynamic marks of expression, together with the terms which indicate the relative time movement of a composition, and certain other terms and phrases, commonly used in music. Important terms treated separately in this work, under their respective titles, are designated by the reference (see special article). Terms which are practically in anglicized form and self-explanatory are omitted.

A. (*It.*)— By, for.

Abbandone, Abbandono, con (*It.*)— With self-abandonment; despondingly.

A battuta (*It.*)— In strict or measured time.

A bene placito (*It.*)— At pleasure as to time.

Absatz (*Ger.*)— A section or musical sentence.

A capella (*It.*)— In the church style.

A capriccio (*It.*)— At will, agreeable to fancy.

Accellerando (*It.*)—With gradually increasing velocity of movement.

Accent.—(See special article.)

Acciaccatura (*It.*)— A grace note forming a species of arpeggio.

Accidents or Accidentals.— Occasional sharps, flats, and naturals, placed before notes in the course of a piece.

Accompaniment; Acoustics.—(See special articles.)

Adagio (*It.*)— A very slow degree of movement, demanding much taste and expression in the performance.

Adagio assai or molto (*It.*)— Very slow and expressive.

Adagio cantabile e sostenuto (*It.*)—Very slow, singing and sustained.

Adagissimo (*It.*)— Extremely slow.

A deux (*Fr.*); A due (*It.*)— For two voices or instruments.

A deux temps (*Fr.*)— Two equal times or measure-notes in a bar, such as in the Valse a deux temps, with six steps to every two of the ordinary waltz.

Ad libitum (*Lat.*)— At will or discretion. This expression implies that the time of some particular passage is left to the pleasure of the performer; or that he is at liberty to introduce whatever embellishments his fancy may suggest.

Affettuoso, Affettuosamente, or con Affetto (*It.*) — With tenderness and pathos.

Afflizione, con (*It.*)— Sorrowfully, with affliction.

Affrettando, Affrettate (*It.*)— Accelerating, hurrying the time.

Agitato, con agitazione (*It.*)— With agitation, anxiously.

Al, All', Alla (*It.*)— To the, or occasionally, in the style of.

Allegremente (*It.*)—With quickness.

Allegro (*It.*) and derivatives.—(See special article.)

All' improvista (*It.*)— Extemporaneously, without premeditation.

Al Segno, Al Seg., or the character 𝄋. signifies that the performer must return to a similar character in the course of the movement, and play from that place to the word Fine, or the mark over a double bar.

Alt, Alta (*It.*)— Higher; as Ottava Alta, an octave higher.

Altissimo (*It.*)—Extremely high as to pitch.

Alto (*It.*)— In vocal music indicates the counter-tenor, or highest male voice. In instrumental music, it also indicates the tenor part.

Amabile (*It.*)— Amiably.

Amoroso, Amorevole, or con Amore (*It.*)— Affectionately, tenderly.

Andante (*It.*)— This term often modified, both as to time and style, by the addition of other words, broadly implies a movement somewhat slow and sedate, but in a gentle and soothing style.

Andantino (*It.*)— Somewhat slower than andante.

Animato, con Anima, Animoso (*It.*)— With animation; in a spirited manner.

Anleitung (*Ger.*)— An introduction, a term often occurring in the titles to German publications.

Anthem.— A composition in the sacred style, of English origin, the words of which are generally selected from the Psalms.

Antiphone.— Responses made by one part of the choir to another, or by the congregation to the priest.

A piacere; Apiacimento (*It.*)— At the pleasure of the performer. (See *Ad libitum.*)

Aplomb (*Fr.*)— Self-contained; steady; exactitude as to time.

Appassionato, Appassionamento (*It.*)— With intensity of feeling.

Appoggiatura (*It.*)— A grace note or note of embellishment which as a passing tone precedes an essential tone on an accented part of a measure.

A quatre mains (*Fr.*); A quatro mani (*It.*)— For four hands. A pianoforte duet.

Ardito (*It.*)— Boldly, energetically.

Aria (*It.*)— An air, or song. Arioso (*It.*)— In the style of an air; vocal, melodious.

Arpeggio (*It.*)— An imitation of the harp produced by playing the notes of a chord in rapid succession, instead of altogether.

Assai (*It.*)— Very, extremely.

A tempo.— In time.

Attacca, Attacca Subito (*It.*)— Attack suddenly or commence immediately.

Audace, con (*It.*)— With boldness.

A una corda (*It.*)— On one string.

A vista (*It.*)— At sight; A prima vista, at first sight.

Bar; Barcarolle; Bass; Beat.—(See special articles.)

Begleitung (*Ger.*)— An accompaniment.

Bellicosamenti, Bellicoso (*It.*)— In martial, bellicose or warlike style.

Bellezza, con (*It.*)— With beauty of expression.

Ben (*It.*)— Well; as ben marcato, in well-marked time.

Bene placito (*It.*)— At will.

Bis (*Lat.*)— Twice; indicating that a passage, distinguished by a curve drawn over or under it, must be performed twice.

Bolero; Bravura (*It.*)—(See special articles.)

Breve.— A note twice the length of the semi-breve or Whole Note, seldom used in modern music.

Brillante (*It.* and *Fr.*)— An expression indicating a showy and sparkling style of performance.

Brio, Brioso, con Brio (*It.*)— With fire, brilliancy and spirit.

Brisé (*Fr.*)— Sprinkled, broken into an arpeggio, in treating of chords.

Buffo, Buffa (*It.*)— Comic; as opera buffa, a comic opera.

Cadence; Cadenza.—(See special articles.)

Calando (*It.*)— Gradually diminishing in tone and quickness; becoming softer and slower by degrees.

Calcando (*It.*)— Pressing on, hurrying the time.

Calmato (*It.*)— With tranquillity, repose.

Calore (*It.*)— With much warmth and animation.

Canon.—(See special article.)

Cantabile (*It.*)— In a graceful and singing style.

Cantata; Canticle.—(See special articles.)

Cantilena (*It.*)— The melody, air or principal part in any composition; generally the highest vocal part.

Cantor (*It.*)— A singer; (*Lat.*) A precentor. Cantoris.— The name given to the north side of the cathedral, the left side facing the altar occupied by the cantor or precentor, and opposite to the side occupied by the decani, or dean and priests.

Cantus (*Lat.*)— A song, chant, or melody; Cantus Firmus, the plain-song or chant.

Canzonet.—(See special article.)

Capella, alla (*It.*)— In the church style.

Capo (*It.*)— The head or beginning.

Capriccio; Capriccioso (*It.*)— In a fanciful, capricious style.

Carol; Cavatina; Chant; Choir; Chorale; Chromatics; Clef.— (See special articles.)

Coda (*It.*)— A few bars added at the close of a composition, beyond its natural termination.

Col, Coll', Colla (*It.*)— With; as col arco, with the bow.

Colla Parte (*It.*)— Implies that the accompanist must follow the principal part in regard to time.

Commodo, Commodamente (*It.*)— Quietly, with composure.

Common Time; Con; Concerto; Concord; Counterpoint.— (See special articles.)

Da Capo or D. C. (*It.*); Diapason; Diatonic; Dilettante; Discord; Dissonance; Dolce; Dominant.— (See special articles.)

Dal. (*It.*)— By: as Dal Segno, from the sign; a mark of repetition.

Decani (*Lat.*)— See Cantoris.

Deciso (*It.*)— With decision, boldly.

Decrescendo (*It.*)— Gradually decreasing in quantity of tone.

Delicatemente, Delicato.— Delicately; con delicatezza, with delicacy of expression.

Dextra (*Lat.*)— The right hand.

Diminuendo or Dim. (*It.*)— Diminish gradually the quantity or intensity of tone.

Divertimento (*It.*)— A short, light composition, written in a familiar and pleasing style.

Divoto (*It.*)— Devoutly, in a solemn style.

Elegamente; Elegante (*It.*)— With elegance.

Empfindung (*Ger.*)— Emotion, passion.

Energico, Con Energia, or Energicamente (*It.*)— With energy.

Enharmonic.—(See special article.)

Espressivo, or con espressione (*It.*)— With expression.

Extravaganza.—(See special article.)

Falsetto; Fandango; Fantasia; Fifths; Figured Bass; Fugue; Fundamental Bass.—(See special articles.)

Forzando or Forz, or *FZ*.— Implies that the note is to be marked with particular emphasis or force.

Fretta, con (*It.*)— With speed: hastily.

Fuoco, con, Focoso (*It.*)— With fire, intense animation.

Galop: Gamut: Gavotte; Gregorian Chant.—(See special articles.)

Gebunden (*Ger.*)— Tied or connected in regard to the style of playing or writing.

Giocosamente: Giocoso; Giojoso (*It.*)— Humorously; joyously; with sportiveness.

Giusto (*It.*)— In just and exact time.

Glee.— A composition for three or more voices, generally in a cheerful style.

Glissando, Glissicato (*It.*)— In a gliding manner.

Grandioso (*It.*)— In a grand and elevated style.

Grave (*It.*)— A very slow and solemn movement; also a deep, low pitch in the scale of sounds.

Graziosamente, Grazioso, or Con Grazia (*It.*)— In a flowing and graceful style.

Gusto, Gustoso, or Con Gusto (*It.*)— With taste, elegantly.

Harmonics; Harmony.—(See special articles.)

Hauptsatz (*Ger.*)— The principal subject or theme.

Hauptstimme (*Ger.*)— A principal part.

Homophony.— In unison.

Imponente (*It.*)— Imposingly, haughtily.

Intermezzo (*It.*)— An interlude; intermediate, placed between two others.

Interval; Intoning; Inversion. (See special articles.)

Istesso (*It.*)— The same, as istesso tempo, the same time.

Key; Kyrie.—(See special articles.)

Largo (*It.*)— A very slow and solemn degree of movement. Larghetto, slower than largo. Larghissimo, extremely slow.

Leading Note.— The seventh note of the scale of any key, when at the distance of a semi-tone below the key note.

Lebhaft (*Ger.*)— Lively.

Legato (*It.*)— In a smooth and connected manner. Legatissimo, exceedingly smooth and connected.

Leggiero or Con Leggierezza (*It.*)— With lightness and facility of execution.

Lento (*It.*)— In slow time. Lentando, with increased slowness.

Loco (*Lat.*)— Implies that a passage is to be played just as it is written in regard to pitch; it generally occurs after 8va alta or 8va bassa.

Lusingando (*It.*)— Soothingly, persuasively.

Lustig (*Ger.*)— Gay, sportive.

Madrigal; Magnificat; Major; Matins; Mazurka; Measure; Melody; Melodrama; Metronome; Minuet; Mode; Modulation; Motif or Leitmotif; Music.—(See special articles.)

Ma (*It.*)— But: as allegro *MA* non troppo, quick but not too much so.

Maestoso (*It.*)— With majestic and dignified expression.

Main (*Fr.*)— Hand: as main droite, main gauche, or M.D., M.G., the right or left hand in piano music.

Mano (*It.*)— Hand; mano dritta, the right hand; mano sinistra, the left hand.

Marcato (*It.*)— In a marked and emphatic manner. Marcatissimo, very strongly marked.

Marziale (*It.*)— In a martial style.

Meno, or Men. (*It.*)— Less; as men. presto, less quick; men. forte, less loud; men. piano, somewhat softer; meno vivo, with less spirit.

Messa di voce (*It.*)— A swelling and diminishing of the voice on a long holding note.

Mesto (*It.*)— Mournfully, sadly, pathetically.

Mezza voce (*It.*)— With moderation as to tone; rather soft than loud.

Mezzo (*It.*)— In a middling degree or manner; as mezzo forte, rather loud; mezzo piano, rather soft.

Mezzo Soprano (*It.*)— A female voice of a lower pitch than the soprano or treble. A C clef for this voice used to be placed on the second line of the stave.

Molto (*It.*)— Very, extremely; as, molto allegro, very quick; molto adagio, extremely slow.

Mordente (*It.*)— A beat or transient shake.

Morendo (*It.*)— Gradually subsiding in regard to tone and time; dying away.

Mosso (*It.*)— Movement; as piu mosso, with more movement, quicker; meno mosso, slower.

Moto, or con moto (*It.*)— With motion, agitation, energy and animation.

Nachdruck (*Ger.*)— Emphasis, accent.

Nocturne.—(See special article.)

Non (*It.*)— An adverb of negation, generally associated with troppo; as non troppo presto, not too fast.

Notation.— The art of representing musical sounds and their various modifications by notes, signs, terms, etc.

Offertory; Opera; Opera Buffe; Oratorio; Orchestra; Organ; Overture.—(See special articles.)

Obligato or Obligati (*It.*)— A part or parts of a composition indispensable to its just performance, and which cannot be properly omitted.

Octave; Ottava.— An interval of eight notes.

Pastorale; Pianissimo; Piano or Piano-forte; Polonaise; Prelude.—(See special articles.)

Parlando; Parlante (*It.*)—In a speaking manner; accented, as if with words in a declamatory style.

Pesante (*It.*)—With weight and importance, impressively.

Piacere (*It.*)—Will, pleasure; as a piacere, at the performer's pleasure in regard to time.

Pietoso (*It.*)—With pity, compassionately.

Piú (*It.*)—More, an adverb of augmentation; as piú presto, quicker.

Pizzicato or Pizz. (*It.*)—In violin or violoncello music, the twitching of notes with the finger, instead of playing with the bow.

Poco (*It.*)—A little, rather, somewhat. Poco a poco, by degrees, gradually. Pochetto, Pochettino, a little, as ritard. un pochettino, play somewhat slower.

Poggiato (*It.*)—Dwelt upon, impressive.

Poi (*It.*)—Then; as piano poi forte, soft, then loud.

Portamento (*It.*)—The manner of sustaining and conducting the voice. A gliding from one note to another.

Presto (*It.*)—Very quick. Prestezza, con, with rapidity, quickness. Prestissimo, the most rapid degree of movement.

Primo (*It.*)—First; as tempo primo, in the first or original time.

Quasi (*It.*)—In the manner or style of; as, quasi allegretto, like an allegretto.

Quieto (*It.*)—With calmness or repose; quietly.

R. or R.H.—Indicates the right hand in piano-forte music.

Rallentando (*It.*)—A gradual diminution in the speed of the movement, and a corresponding decrease in the quantity of tone.

Recitatif (*Fr.*).—(See special article.)

Resolution.—The concord which necessarily follows a preceding discord.

Retardando, Ritardando, Ritardato, Ritenente, Ritenuto (*It.*)—A gradual retarding and decrease in the speed of the movement.

Rhythm.—The theory of musical cadence, as applied to melody, more broadly defined in the first part of this article, to which refer.

Riccercari (*It. plu.*)—Difficult exercises for the voice or for some instrument.

Ricordanza (*It.*)—With recollection, remembrance.

Rinforzando, Rinforzato, rinf. or rf. (*It.*)—With additional tone and emphasis.

Rondeau or Rondo; Round.—(See special articles.)

Rubato or Robato (*It.*)—Robbed, borrowed. Tempo rubato is applied to a style of performance in which the interpreter, to express some emotional mood, holds some notes longer than their legitimate time, curtailing others of their proportionate durations in order that, on the whole, the aggregate value of the bar may not be disturbed.

Sanctus; Saraband; Serenade; Solfaing; Solfeggio; Sonata; Soprano; Stabat Mater; Symphony; Syncopation.—(See special articles.)

Scherzando, Scherzante, Scherzo, Scherzoso, or Scherz (*It.*)—In a light, playful, and sportive manner. Scherzandissimo, in an exceedingly playful style.

Sciolto (*It.*)—With freedom and boldness.

Sdrucciolato (*It.*)—Sliding or gliding the finger along the keys, or strings of an instrument.

Segno or $ (*It.*)—A sign; as al segno, return to the sign; dal segno, repeat from the sign.

Segue, Seguito (*It.*)—Now follows, or as follows; segue il coro, the chorus follows; segue la finale, the finale now follows. It is also used in the sense of in similar or like manner, to show that a subsequent passage is to be played like that which precedes it.

Sempre (*It.*)—Always; sempre staccato, always staccato or detached; sempre forte, always loud; sempre piú forte, continually increasing in force.

Senza (*It.*)—Without; as senza pedale, without pedals.

Sinistra (*It.*)—The left hand.

Sforzando, Sforzato or Sf. (*It.*)—Implies that a particular note is to be played with emphasis and force.

Sino or Sin' (*It.*)—As far as.

Smorzando (*It.*)—A gradual diminution as to tone.

Solmization.—The same as solfaing.

Sospirando (*It.*)—Despondingly, with apprehension.

Sostenuto or Sost. (*It.*)—Sustained, continuous in regard to tone.

Sotto (*It.*)—Below, under; as sotto voce, in an under tone.

Staccato (*It.*)—Implies that the notes so marked are to be played distinct, short, and detached from one another. Staccatissimo, very detached.

Strepito, Strepitoso, Stentato (*It.*)—In a noisy, boisterous manner, for some particular effect.

Stretto (*It.*)—The knot. That part of a fugue in which the subject and answer succeed one anothe at a very short interval of time. In modern music. it is sometimes used to imply an acceleration of the time near the close of the piece.

Stringendo (*It.*)—Accelerating the degree of movement.

Tarantella; Temperament; Tempo; Theme; Tone; Treble; Trio; Triplet. (See special articles.)

Tanto (*It.*)—Not so much; not too much.

Teneramente, Tenero, or Con Tenerezza (*It.*)—Tenderly.

Tenuto, Tenute, or Ten. (*It.*)—Implies that a note or notes must be held on, sustained, or kept down the full time.

Thorough Bass or Figured Bass.—A bass part with figures placed over the notes which indicate the harmony to be played to each note, and serve as a guide to the accompanist.

Toccata (*It.*)—A composition of indefinite form and rapid movement somewhat in the style of the fantasia (q.v.).

Transposition.—Changing from one key to another for performance or transcription.

Traurig (*Ger.*)—Sad.

Tremolo (*It.*)—The reiteration of a note or chord with great rapidity so as to produce a tremulous kind of motion.

Trill or Tr.—A shake.

Tutti (*It. plu.*)—All. A term used to point out those passages where all the voices, or instruments, or both, are to be introduced.

Va (*It.*)—Go on: as va crescendo, continue to increase in loudness.

Variamento (*It.*)—In a varied and free style of execution.

Veloce or Con Velocita (*It.*)—In rapid time. Velocissimo, with extreme rapidity.

Vibrato, Vibrante, Vibrate (*It.*)—With a strong vibrating quality of tone.

Vistamente (*It.*), Vite, Vitement (*Fr.*)—With quickness.

Vivace, Vivamente, or Con Vivacita (*It.*)—With briskness and animation.

Vivo, Con Vivezza (*It.*)—Lively, vivaciously.

Vocalize.—To practice singing on the vowels.

Volante (*It.*)—In a light and rapid manner.

Volonté (*Fr.*)—Will, pleasure, as a volonté, at will.

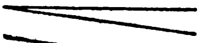
Volta (*It.*)—Time of playing a movement; as prima volta, the first time of playing.

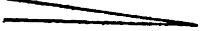
Volti subito or V. S. (*It.*)—Turn over the page quickly.

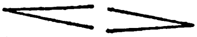
Voluntary.—An organ piece, generally consisting of two or three movements calculated to display the capabilities of the instrument and the skill of the player, and used before or after service, or during the offertory.

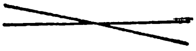
Zoppo (*It.*)—In a halting or limping manner. A style of melody in which a long note is always placed between two short notes.

Characters indicating the various degrees of loud and soft:

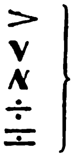

Crescendo or gradual increase of tone.

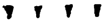

Decrescendo or gradual decrease.

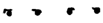

Indicates first a crescendo, then a decrescendo.

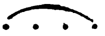

Indicates first a decrescendo, and then a crescendo.

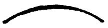
Marks of accent and expression:

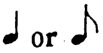

Indicate a stress or marked accent on any single note or chord. The abbreviations rf. sf. sfz. fp., or even f over a single note are also used for the same purpose.


Dashes indicate notes struck staccato or very short, that is, not held their full value.


Dots, notes struck short, but not in so marked a way as the preceding.

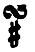
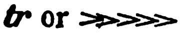
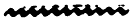
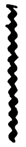

Curves and dots. Notes still less staccato.


Slur, or legato mark.

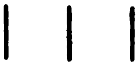
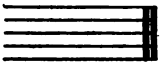
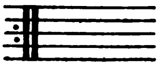
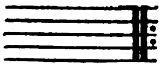
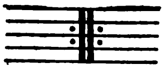
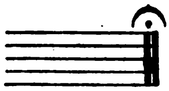


Graces.—Indicates the appoggiatura, whether superior or inferior.

Turn.

	Inverted turn.
	Turn with the note above made flat.
	Turn with the note below made sharp.
	A shake.
	The vibration or close shake.
	Indicates that the chord before which it is placed must be sprinkled or arpeggioed.

Characters used to separate a movement into its component parts or strains, marks of repetition, etc.:

	Bar lines, dividing a movement into small equal portions of duration.
	Double bar, indicating the limit of a measure.
	Double bar, with a repetition of the preceding strain.
	Double bar, with a repetition of the following strain.
	Double bar, with a repetition of the strain on each side.
	The close, or character indicating the end of a piece of music.

Consult: Baker, 'Dictionary of Musical Terms' (1902); Bowman-Weitzman, 'Manual of Musical Theory' (1876).

Charles Leonard-Stuart,
Editorial Staff, 'Encyclopedia Americana.'

Musical Festival, a series of performances with large choral and orchestral auxiliaries usually held in large cities yearly or bi-yearly. The first known of these festivals was the great Handel Commemoration (1784–7). Festival performances of Handel's oratories were given in Berlin and other continental cities. In the United States the better known entertainments of this kind are the Cincinnati Musical Festival and the Worcester, Mass., Festival. See Oratorio.

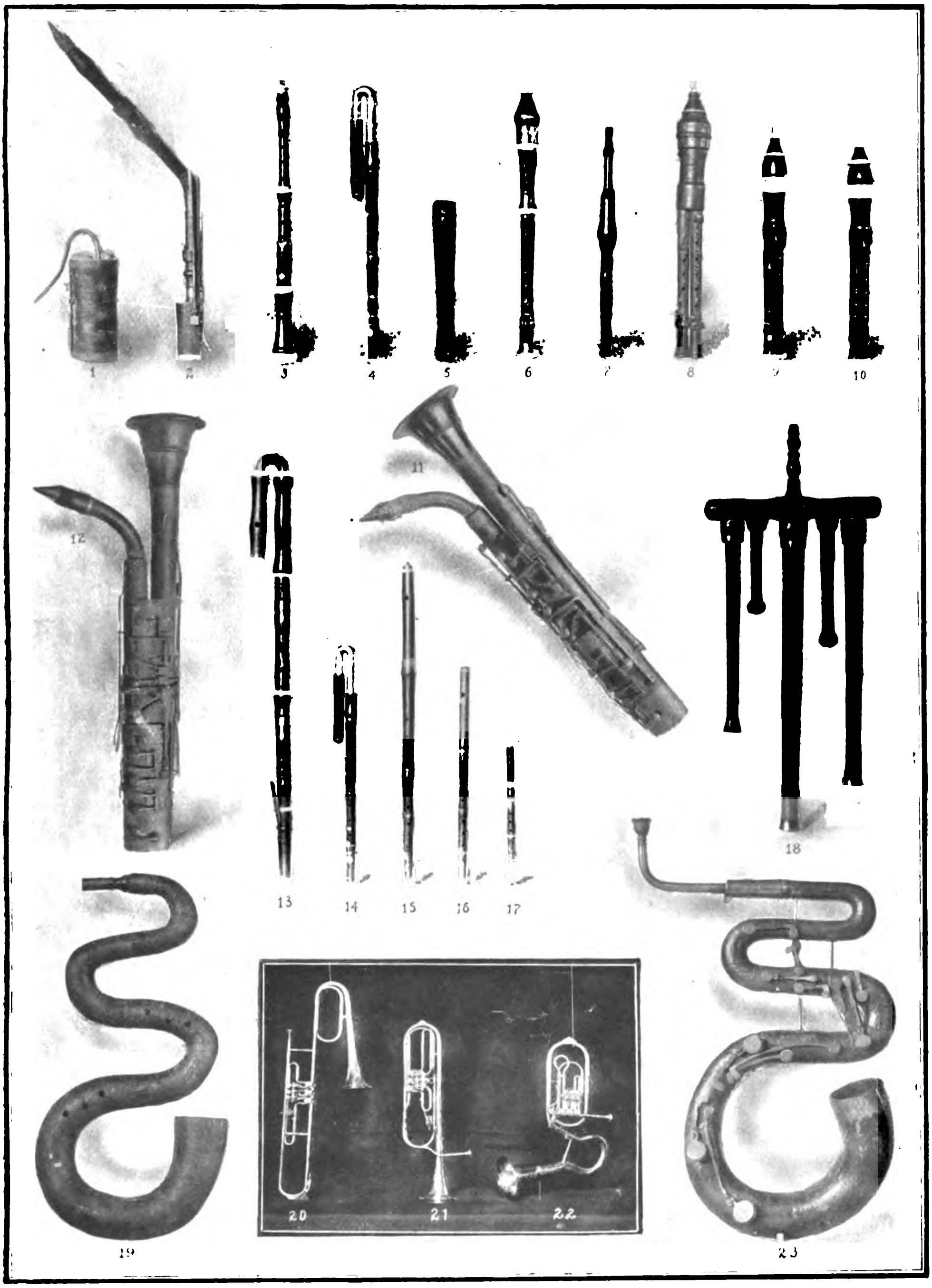
Musical Instruments, mechanical devices from which musical sounds are produced by the vibration of strings, the movement of air-columns in tubes, and the vibration of solid and hollow bodies of resonant materials. Of very ancient origin, their earliest forms were probably derived from suggestions offered by inanimate nature. The earliest authentic record of a musical instrument giving a complete diatonic scale, is that of a flute of Egyptian origin; but, it is more than probable, that the first instruments were those of percussion, such as drums, cymbals and gongs, which were suggested by the clapping of the hands, the stamping of the feet, and the resonance of hollow trees under the impact of blows. These were followed by the wind instruments, such as whistles and flutes, suggested by the sighing of the wind through standing reeds and bamboo groves. They were first used, probably, for hunting purposes; subsequently, to express human emotions, and for purposes of amusement.

When the human ear learned to recognize variations of pitch, and to distinguish tune from time, the twanging of bowstrings probably suggested the stringed instruments, such as the harp, lute and lyre.

These three stages of the development of musical instruments are very clearly established by existing examples of gongs of stone and flutes of bone, found among the flint implements of the ancient cave-dwellers, and in the tracings of the later forms — stringed instruments, in the sculpture of ancient Babylonia, Egypt, and Greece. It is impossible, however, to determine the exact origin of any one of the higher classes, such as those of the third stage; since even that of the lyre is ascribed by Egyptian and Greek mythology to the god Toth (Hermes), thus throwing the entire question of origin beyond the pale of practical facts. Therefore, the most convenient way to describe them is by reference to their use in the various countries in which they were produced.

Prehistorical forms of musical instruments have their counterparts among the many savage tribes and nations of civilized mankind who inhabit the various parts of the world at the present time. African Kaffirs, the Caribs, Peruvians, and other Indian races of the American continents, and the wild inhabitants of Australia, New Zealand, and the other Polynesia Islands, use various forms of gongs, flutes, and harps. The war trumpets of the Maoris are of remarkable power, the sounds of which are capable of being heard at a distance of several miles. Among the more highly civilized nations, the Chinese possessed a system of music and its instruments centuries before the birth of the Greek and Roman empires. The invention of these is ascribed to a mythical emperor, Kai-tien-chai, who ruled during a period about 2500 B.C. The eight instruments he made are supposed to reproduce the sounds of eight substances — tanned skin, stone, metal, clay, strings of silk, wood, bamboo, and calabash or gourd. They consisted of drums, musical stones, bells, clay whistles or flutes, called «hiuen,» the «kin,» a form of lyre with seven strings, the «che,» of 25 strings, and the «siao,» a pan-pipe of 16 bamboo pipes bound together. All of them are used at the present time, together with the «cheng,» an elementary reed organ equipped with a calabash, which supplies the necessary resonance. Trumpets and banjoes are also used, and a stringed instrument resembling a mallet, the sounds of which are of the most execrable character. Its value in an orchestra appears to be quite beyond the appreciation of any but a Chinese ear. They have two scales corresponding to the white and black keys of the modern pianoforte, and, although by employing both of these scales, they could reproduce modern Occidental music, they appear to be satisfied to confine themselves to the five-note scale, and produce a slow music overlaid with a great amount of noise and clatter, through which it is im-

MUSICAL INSTRUMENTS



1. Wurst fagott. 2. Basset horn (nineteenth century). 3. Oboe (France. Camus, eighteenth century). 4. Transverse flute. 5 and 6. Double flutes. 7. Flageolet (French, nineteenth century). 8. Double flute. 9 and 10. Flutes á bec. 11. Clarinet (Italy, early nineteenth century). 12. Clarinet (France). 13, 14, 15, 16, and 17. Transverse flutes with keys. 18. Flute polyphonique (Italy, seventeenth century). 19. Serpent. 20, 21, and 22. Trombones. 23. Serpent (made in England, 1820).

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possible to distinguish the underlying truly musical notes of great rhythmic beauty.

Almost all of the Chinese instruments, slightly modified, are used by the Japanese. The «kin» and «che» are represented by the «koto,» of 6 to 13 strings. They have also the «samisen» of 3 strings, which are plucked by a plectrum, and the «kokiri,» an elementary violin played with a horse-hair bow. Their orchestra is usually composed of one large drum, two small drums, two little bells, a pair of modern clappers, and a flute, which is the only one of the seven capable of giving more than a single tone. Bells, and metal in other forms, such as chains and gongs of various sizes, are extensively used in all Oriental countries to produce metallic music. In Pegu, Siam, and Burmah, arrangements consisting of 20 bells united in one instrument, which is sounded by being struck with a stick, are frequently employed. The Javanese bells, usually arranged in sets of 12, when heard at a distance sound like an orchestra of stringed instruments.

In Hindustan, and all of the countries contiguous to that great peninsula, the principal instrument is the «vina,» a form of guitar. It consists of seven long metal strings strung on a hollow bamboo body, at each end of which a gourd is fixed to increase the resonance. It has a finger-board like that of the guitar, upon which the frets are stuck with wax by the performer. The strings are tuned at large intervals, and its full, delicate tone is capable of rendering rapid and brilliant passages. It reached its highest state of perfection in the 17th century, when the Hindu, Djivan Shah, became renowned as its most famous player. Some of the other important Hindu instruments are the «magoudhi,» also of the guitar type; the «serinda,» with three strings of spun silk; and the «ravanstron,» a two-stringed violin. The two last-named are played with a simple bow. They also use a great many varieties of drums, gongs, and bells.

Among the Singalese, the favorite instrument is a drum commonly known as the «tom-tom,» a name which literally signifies its peculiar quality of music. It is made in various sizes, and consists of a short cylinder of wood from 4 to 6 inches high, and 1 to 4 feet in diameter, with sides ½ to 1 inch in thickness, over which a skin is mounted. Before using, they are heated to a high temperature to increase the tension of the skin, and are then played upon by the hands, the blows being delivered in rapid succession on the edge of the drum. The performers are always women, and the test of the ability of a player depends upon the amount of noise produced and the duration of a continuous play.

With the westward advance of civilization, the development of Arabian music produced the «rehab,» an instrument of two strings, which were at first plucked like those of a guitar. It was subsequently played with a bow, and is supposed to be the progenitor of the modern violin. Other Arabic instruments are the «lute»; the «canon,» a stringed instrument; the «dulcimer,» with strings tuned in sets of three — a system adopted in the modern pianoforte; the «zamar,» the prototype of the modern oboe; the «nefye,» a form of trumpet; the kettledrum, and various kinds of flutes.

The Egyptians used harps, guitars, mandolins, several forms of lutes, and the lyre, as early as the beginning of the 18th dynasty. Their percussion instruments were large and small drums with sides of baked clay, over which the skins were stretched. Like the Singalese «tom-tom,» they were heated prior to being played upon. Metallic music was produced by the «sistrum,» a set of metal bars which were struck or shaken rhythmically. Although their instruments were often employed in orchestral combinations, it is impossible to determine whether they were played in harmony or merely in unison.

While the Egyptians showed great genius in the invention and adaptation of musical instruments, those of the ancient Hebrews were borrowed almost entirely from other nations. They used the «kinnor» or harp, and the «asor,» an instrument of 10 strings, both of which were forms of lyres; the «neble,» a modification of the Arabic dulcimer, and the «timbrel,» a small tambourine or hand drum. They also used flutes and trumpets, the guitar and the sistrum. Their organs were simple sets of pan-pipes, which varied in the number of pipes set up, and the number of tones given by each pipe. The most famous of these is the one mentioned in the Talmud as set up in the Temple at Jerusalem. It is stated that its sound could be heard at a distance of 10 miles. Its name, «magrepha» (fire-shovel), leads to the inference that it might have been operated by the pressure of hot air, or even steam, like some of the various forms of eolipiles.

The ancient Greeks employed the music produced from stringed instruments, by striking or plucking, as an accompaniment to the recitation of their epic poems, the chants of their religious ceremonies, and in connection with martial evolutions. Their most important instrument was the «kithara,» a lyre of seven strings, which were sounded by being plucked with a plectrum. They also used several kinds of single and double reed flutes, in the playing of which they acquired surpassing skill. In the rendering of refined music trumpets were discarded at a very early date, but continued in use for military purposes, and at the public games, down to a comparatively late period.

The music of the early Romans was merely an imitation of the Greek art, but their representative instrument was the «tibia,» a wind instrument of the flute type, instead of the lyre. Stringed instruments played with two bows were unknown among them, and the historical statement that «Nero fiddled while Rome burned» must certainly be relegated to the domain of myths.

For a long period of time after the fall of the Roman empire, the decadence of the art of music limited the use and retarded the development of musical instruments. During the Dark Ages the musical thread was continued by bands of strolling players, whose efforts were of the most superficial character, and music thus remained latent until the 12th century, when the poetry of the «troubadours» in Provencal literature was converted into the emotional songs of the «trouvieres» and the German «minnesingers,» and required instrumental music for accompaniments. Those brought into use again were several forms of lutes, violins, and bag-pipes, which were played upon proficiently by the "jongleurs," some of whom played also upon psalteries, organistrums, guitars, and tambours with great skill. These instruments were made in unique forms, especially the organistrums, which were lutes operated by wheels and keys.

Under the impulse of the Renaissance, a large number of other instruments were developed, such as flutes, flageolets, clarinets, trombones, and various forms of monochords, their development keeping pace with the evolution of music up to its higher forms; but it was not until about the end of the 16th century that any attempt was made to combine them into a definite orchestra, the development of which is coincident with that of the opera.

The first approximation to an orchestra was the group of instruments employed in connection with the production of Cavalieri's oratorio, 'La Rappresentazione dell' Anima é del Corpo,' at Rome in 1600; but the first definite orchestra was the one that accompanied the first opera ever performed in public — Peri's 'Euridice' — at Florence, in the latter part of the same year. It was composed of a harpsichord, a guitar, a viol da gamba, a theorbo or large lute, and three flutes. In both cases the combination of the instruments was designed to afford the simplest possible accompaniment to the dramatic recitative; but a few years later Monteverde noted the individual peculiarities of the several instruments, and introduced a new system of orchestration by which the number of pieces was greatly increased, and the instruments given a score practically free from the limitation of the vocal parts. His opera 'Orfeo,' produced at Mantua in 1608, was accompanied by 36 pieces, 22 of which were stringed instruments, mostly viols, thus making them the foundation of the orchestra. With the evolution of the dramatic work to higher forms, better accompaniments were required, and the preponderating viols were superseded by violins, during the earlier part of the 18th century, while later on, during Handel's time, Lully introduced flutes into the French orchestra to double in unison the parts of the stringed instruments. The strengthening of the violins is shown to a marked degree by the orchestras of Scarlotti and Lyrenzi, as many as 20 violins entering into their composition. Up to this time, however, the real art of writing for the strings was unknown. The works of the elder Bach, probably the greatest master of part writing, and those of Handel, subsequently reorchestrated by Mozart, show a great lack of appreciation of tonal coloring, and it remained for Haydn to lay the true foundations of the modern science of instrumentation. He dispensed with the obsolete instruments employed by his predecessors, and arranged five combinations by the skilful use of which are produced the great orchestral effects of the present time. They are (1) the complete string band, composed of two violins, violas, violoncellos, and contrabasses; (2) the string band supported by wind instruments playing in unison with the string parts; (3) the string band supported by the wind instruments in the free parts; (4) the string band with wind instruments playing in the separate passages; and (5) the string band supported by and contrasted with a complete wind band.

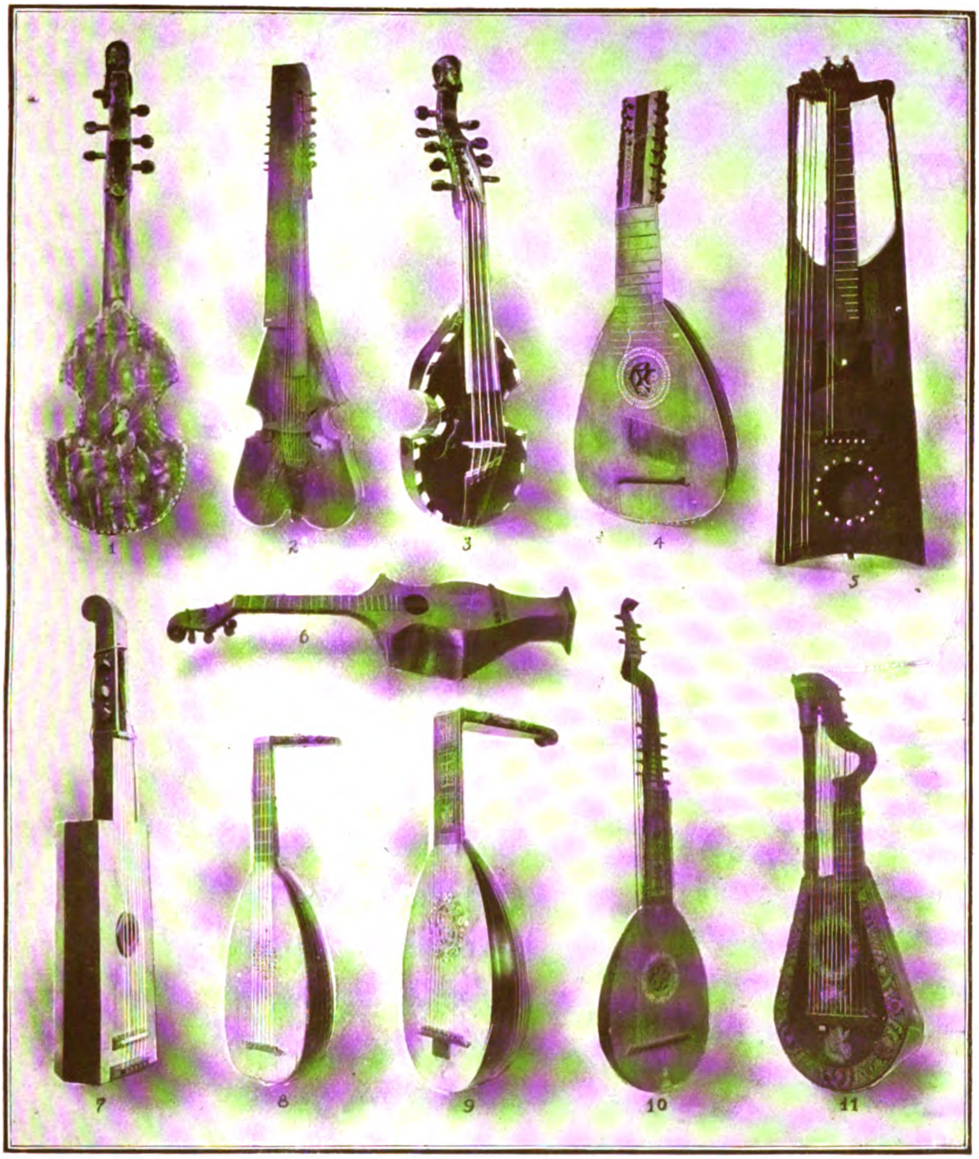
The instruments entering into these combinations in a modern orchestra may be conveniently arranged into four general groups, according to the means employed to produce their sounds, and in the order of their respective importance, as follows: (1) stringed instruments; (2) wind instruments; (3) instruments of percussion; (4) instruments operated by keys arranged in a keyboard.

The stringed instruments may be subdivided into two classes: (1) bowed instruments, or those in which the sound is produced by drawing a horse-hair bow across the strings; and (2) those in which the sound is produced by twanging the strings with the fingers, or with a plectrum of bone or ivory. To class 1 belong the violins, violas, violoncellos, and the double bass. Plate 1 shows typical forms of some of the 18th century makes.

The violin is the most important instrument in an orchestra, and the first violinist ranks next to the conductor himself, and ought to be a performer of the greatest ability, and fully capable of playing the obligato passages that occur frequently in modern scores. It is the most personal of all instruments, capable of expressing every human emotion from sadness to merriment, and from the deepest love to the utmost frenzy of hate; its use in the orchestra is varied, continuous, and extensive. In the violin quartet the next important instrument is the second violin, which, being played in a lower part of the accordance, gives the difference of sound heard between itself and the first violin. The viola or tenor takes the third place and is a fifth lower in the accordance, the open notes being C and G below, and D and A above, middle C. It is played exactly like the violin, and its part in the score is notated in the alto clef. It has a wonderfully beautiful and peculiarly plaintive and melancholy tone quality. The fourth place is filled by the violoncello or bass viol. Its strings are tuned in fifths, one octave lower in pitch than those of the viola, the accordance being C below and C, D, and A in the bass clef. It has a compass of three and a half octaves, and its tone color, like that of the violin, is capable of expressing with surpassing faithfulness all of the human emotions. Its harmonies are rich and full; the "pizzicato," especially telling in effect, while the tone of the A string is the most suitable of all instrumental music for passionate expression. The contrabass or the double bass is used to double the part of the violoncello an octave deeper. While the violoncello is the bass of the stringed instruments, the contrabass is the bass of the whole orchestra. They are of two types, those with three strings tuned in A, D, below G in the first space in the bass clef, and those with four strings tuned in E, A, D, and G, in ascending order, an accordance rendered necessary by the works of modern composers. Its tone is gruff and ponderous, unfitting it for use as a solo instrument, but it is used with great effect to give an ominous significance in solo passages, and in imitating such effects as the rumblings of a thunder storm, frequently employed by many of the great composers.

To class 2 belong the mandolin, guitar, and banjo, instruments of a few strings, and the harp and zither, instruments of many strings. Of these the harp is the most important. Of

MUSICAL INSTRUMENTS



1. Alto viol, with six strings and pegs (made in France, eighteenth century). 2. Baryton (Viola di Bordone, 1779). 3. Pochette D'Amour (France, eighteenth century). 4. Mandora (made in Italy, eighteenth century). 5. Lyre guitar (eighteenth century). 6 and 7. Guitars. 8 and 9. Lutes. 10. Theorbo (made in Italy, eighteenth century). 11. Harp Lute (1800. Light London).

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very ancient origin, probably Assyrian, it has been used by the musicians of almost all of the ancient and modern nations. The «minnesingers» employed it in combination with the guitar to accompany the songs of the troubadours. In 1720 Handel introduced harp parts in one of the choruses of the oratorio of 'Esther.' Gluck employed it to play the part of the lyre in the hands of Orpheus. Mozart wrote a concerto for it in combination with the flute, and Wagner introduced eight of them in the closing scene of 'Das Rheingold,' their shimmering music giving an indescribable splendor to the entrance of the gods into Valhalla. The great musical value of the harp is its sympathetic tone quality, and the power of its full-sounding «arpeggios» or sweeping chord effects. Almost all of the music written for the pianoforte can be reproduced effectively on the harp, but it is almost incapable of rendering the chromatic passages. It is the only instrument of this class that forms a part of a regular orchestra, the mandolins and zithers being used only in the orchestration of large compositions. The tones of the guitar are especially suitable as an accompaniment for the human voice, and are notably used for this purpose by Rossini in Almaviva's air in the 'Barber of Seville.'

As previously stated, wind instruments were introduced into the orchestra by Lully merely to double in unison the parts of the stringed instruments; but since then various changes and improvements have been made by eminent flautists and skilful flute-makers, especially those of the 19th century, until their importance is hardly exceeded by that of the stringed instrument.

They may be divided into two classes, according to the materials of which they are made: (1) wood-wind, and (2) brass instruments. Many of both classes are of the transposing type — instruments in which the sounds actually produced are a key either above or below that in which the composition is written. To the wood-wind band belong the flute, piccolo, flute a beck, horn or cor anglais, bassoon, double or contra-bassoon, flageolet, and the clarinet. They are usually made of wood, and sometimes of ivory and silver; but their particular tone qualities do not depend so much upon the material of which they are made as upon their form and the elasticity of the sides of the tubes. The flute, which is the most facile of them all, has a full chromatic compass from middle C to G, two octaves above the treble clef C, a range of three octaves. This compass is partly obtained by altering the pressure of the blowing, all of the notes below D in the treble being produced by the normal pressure, while the harmonics D in the treble clef and A and B above it are attained successively by over-blowing. In the orchestra the flute goes with the violins, its part in the score being written at the top in G clef. It is also used to sustain the long notes of the other wood-wind instruments, and, being the closest approximation of artificial sounds to the human voice, is used effectively in the conversational passages, and enhances the characteristic charm of orchestral music. In the form of the «piccolo,» or octave flute, it is more frequently employed to double the melody in the highest octaves and to accentuate brilliant points of effect in the score. It is exactly an octave higher than the flute proper, and is very shrill in the over-blown notes, so that, unless very carefully played, tends to vulgarize the music. Other forms are the D-flat or minor ninth transposing piccolo; the flute d'amour, a minor third below the ordinary flute; the E-flat or «tierce,» and the fife. The last named, in its old cylindrical form, gave low, piercing notes, and was extensively used in military music, but it has been entirely superseded for that purpose at the present time by a small flute, still called a fife, which forms a component part of a modern fife and drum corps.

Next in importance to the flutes is the family of oboes, represented during the 16th and 17th centuries by the little schalmey, the discant schalmey, the alto, the tenor, and the pommers. The modern oboe was evolved from the discant schalmey, and is a double-tongued reed instrument. Its fundamental sounds are reproduced an octave higher by over-blowing, its scale being thus increased to two partially chromatic octaves, which are made completely chromatic by the use of keys which permit the lengthening of the air column in the lower tones, and the introduction of other partial tones than the first harmonics in the higher notes. Like the flute, it has only the soprano register — B-flat below middle C to F above the treble clef, about two octaves and a fifth. The basis of the scale is D major, and its place in the orchestra is between the flute and the clarinet. A modern orchestra employs two oboes — the non-transposing treble oboe, for which the music is written in G clef, and the «cor anglais,» a transposing instrument, the mournful sounds of which are especially suitable to accentuate the depressing effect of the sad or serious dramatic passages.

The bassoon is the bass of the oboe, and fulfills that function to the entire wood-wind band. It was evolved from the pommers, bombards, tenors, and basses of the 16th century, and possesses advantageous tonal characteristics and adaptability. It has a compass of three octaves — from B-flat, an octave below that in the bass clef, to B-flat in the treble clef — and is usually played with the violoncello, the united tone of the two instruments being very effective. The contra-bassoon is an octave below the violoncello, and is the deepest instrument of the orchestra. Its compass extends as far as B-flat, next to the lowest note of the pianoforte. It is but rarely used, although its grand sounds, like those of a great organ pipe, may be used effectively, as in the grave-digging scene of Beethoven's 'Fidelo,' and in Handel's anthems, written for the coronation of George II. in 1727. Although a wood-wind instrument, it is now also made in brass with a reed mouthpiece. The sarrusophones, invented by Sarrus of France, comprise a complete family of this type. They are larger than the corresponding wooden oboes, and are therefore louder in tone, and are extensively used in military bands. Other forms of double-reed instruments are the «cormorne,» made of wood and cylindrical in shape, with the lower end turned up like a shepherd's crook. The name is derived from the German *Krummhorn,* and the French call it the *tournebout.* It has a bleating tone. The familiar Highland bagpipe, and various forms of oboe instruments equipped with reservoir of air and furnished with drones enclosing single reeds, such as the «cornemuses,» and the «musettes,» complete the series.

Of the single-reed instruments, the «clarinet» is the most important. It was invented by Christopher Denner of Nuremberg, in 1690, and embodies the very ancient principle, that of the «squeaker» reed, which is commonly made by children even at the present time.

Of the several forms of clarinets those in A- and B-flat are used by the modern orchestra, while the B-flat and E-flat instruments are used in military bands, in which their functions correspond to that of the violins in the orchestra. The C clarinet with its shrill tone is seldom used. Their color varies according to the register. The ordinary notes are eloquent, heroic, and tender; in the lower register they become spectral, and impressively sombre in the bass. Although the last instrument introduced into the orchestra, all the great composers wrote for it, and considered it favorably. With Mozart it was one of the leading instruments of the orchestra, and in his beautiful E-flat symphony, written in 1788, clarinets are employed even in the place of the oboes.

As in the case of the double-reed wood-wind instruments, in which the mouthpiece is used with a metal tube and gives the sarrusophone, the adaptation of the clarinet-reed to a brass tube gives the family of «saxophones,» invented by Adolph Sax in 1846. They resemble the clarinets very closely in shape; have a full, rich, penetrating tone-color, and are extensively used by the military bands of France and Belgium, and have also been used with great advantage in the French orchestras.

Of the «brass instruments,» the most important are the horns, cornets, trumpets, trombones, and tubas. Two other forms, the ophicleide and the serpents, though frequently employed in the older orchestral scores, are now obsolete, having been entirely superseded by the tuba.

There are two important differences between the wood-wind and the brass instruments. In the former the tones are produced by vibrating air-columns, or by vibrating single or double reeds, and alterations of pitch are accomplished by shortening the air-columns, while in the latter the vibrations utilized are those of the player's lips, which are pressed against a round, cup-like mouthpiece, and the air-column is lengthened to alter the pitch. The brass instruments are capable of giving a much larger number of partial tones naturally than the flutes, oboes, and clarinets, which use only a few notes of the harmonic series, and derive such partial tones from the fundamental tones, or from the overtones. Horns and cornets furnish romantic tone-coloring, and are effectively used in connection with forest and hunting scenes, while the trumpets are employed to express brilliant martial passages depicting heroic deeds. Trombones and tubas are grand, sonorous tubes which afford a solemn and menacing tone-color to the splendor of a full orchestra, and are also advantageously used to depict coarse and brutal scenes. All of them are valuable components of modern military bands. Plate II. illustrates various types of wind instruments, developed from their original forms into perfect instruments during the latter part of the 18th and the earlier part of the 19th centuries.

The instruments of percussion are those which are incapable of giving many tones, or playing definite melodies, like the stringed and wind instruments already described. They are of two classes — those that give an actual tone, such as the kettledrums, glockenspiel, and xylophone; and those without any definite pitch, such as the bass and small drums, tambourines, cymbals, castanets, and triangles. Of these, the kettledrums are the most important, and, together with the cymbals, are extensively used to emphasize military effects; while the others serve to express those that are purely rhythmical.

For detailed descriptions of all of the instruments mentioned, see special articles under their respective titles.

For descriptions of keyed instruments, see articles on the organ and the pianoforte.

Bibliography.—For further detailed information consult: Elson, 'Orchestral Instruments and their Use' (Boston 1903); Hawkins, 'General History of the Science and Practice of Music' (London 1875); Hofmann, 'Katechismus der Musikinstrumente' (Leipsic 1890); Vidal, 'Les Instruments a Archet' (Paris 1878); and Schletterer, 'Die Ahnen moderne' Musikinstrumente' (Leipsic 1882).

WILLIAM MOREY, JR.,

Musical Instruments, Mechanical. The record of inventions and devices in this field shows a great variety of shapes, sounds and methods of operation. One of the most famous in this class of music-producers was Barnum's steam calliope, used for many years in circus processions. Organs of all sizes and shapes, set in motion by the occasional turning of a crank or pressing of a button, are widely used for purposes of public entertainment. Swiss music boxes with cylinders and American music boxes with discs are embraced in the same class. There are also mechanical banjos, violins, zithers, mandolins and trombones.

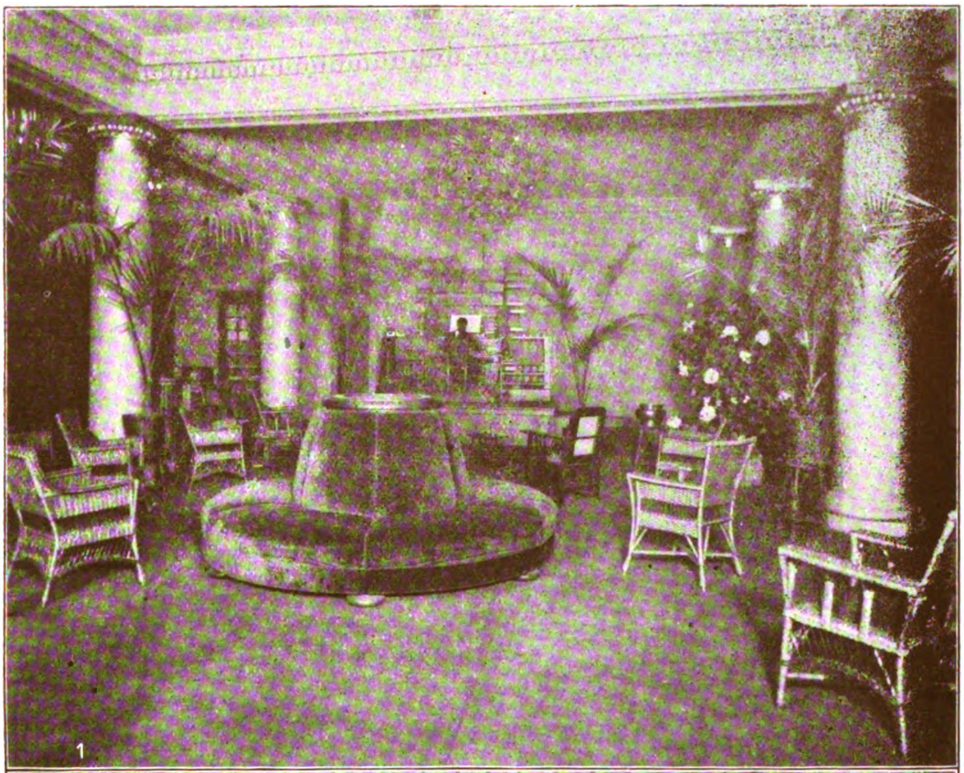
Progress of the Piano-Player.—Since the advent of the first piano-player, a few years ago, rapid strides have been made in the creation and production, by purely mechanical methods, of classical and popular music. The perforated roll, passing over a perforated wooden cyclinder, such roll and cylinder representing, together, the music-producing medium when aided by bellows, formed and still forms a leading feature of the automatic idea in piano-playing. See PIANO.

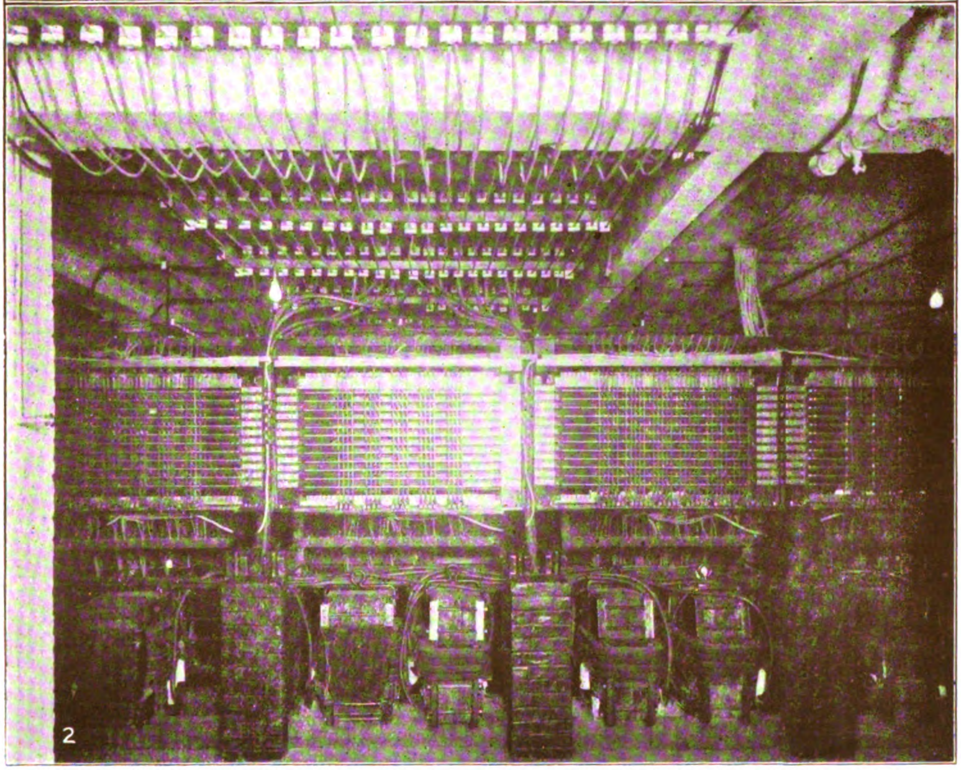
The earliest efforts of those who undertook to create and introduce mechanical harmony effects yielded crude, unsatisfactory, and unpromising results. Progress was blocked at every turn by practical difficulties not contemplated in theoretical calculations and experiments.

First Products.—Among the first products of the mechanical piano-playing movement was an odd-appearing, seemingly over-elaborate accumulation of rubber-tubes, strikers, bellows, and pedals, nearly all of these contrivances and accessories being fixed to a wooden frame and inserted in the back part of the piano, between the frame-posts. It was found impracticable to include all necessary material without increasing the size of the piano proper. This was accomplished by adding several inches to the piano's depth.

Portable Players.—Notable among the next

MUSICAL INSTRUMENTS, MECHANICAL.





1. Auditorium with key boards and outlets. The outlets for the music are arranged in the setee in center of the room and in the hydrangea at the side.
2. The tone mixers.

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succeeding stages of piano-player development was the invention and perfecting of a movable and easily-portable player having cylinder, perforated rolls, and pedal action. About half the regular piano width and only a trifle higher than the keyboard, this «supplement» can be moved at will to the centre of the piano, in front. Operation of the pedals results in the bringing of any one or more of a series of hammers or strikers in direct contact with the key-surfaces, speed and force being regulated by several thumb-pieces projecting from the player top or side. Players of this description, with many variations, are still in use but have been partially superseded by more recent contrivances.

Interior Players.— After many costly experiments, covering several years, an interior player, which has been very successful thus far and promises to evolutionize the whole industry of piano-making, was perfected. It was found possible to minimize the parts in such a way that practically the entire player apparatus, excepting, of course, the pedals, could be placed above the keyboard in front of the action and behind the fallboard, the latter hiding it completely from view. Thousands of these pianos containing mechanical players have already been made and sold by the firm of patentees and other manufacturers, the latter paying royalty charges to the former for privileges. Makers of pianos of all grades have accepted this interior player, with modifications, as permanent, and steps are now being taken in many instances to embody it as a standard feature in regular piano styles.

Electricity Introduced.— In the interval between the perfecting of «movable» and «interior» piano-players, an enterprising practical New York electrician and piano-action maker secured certain important player rights and privileges and set to work on the problem of electrical operation. Experiments, extending over several years, were finally successful. Electrical attachments were devised and introduced in such a manner as to make it possible for any person or firm, in any part of the world, having a simple electrical connection, to start and stop the player at will. The advance in usefulness of the mechanical piano-player thereby reached a stage where it only needed the occasional insertion of a perforated roll to produce, without any further physical effort whatever, perfect musical effects, including correct tempo and proper expression.

Continuous Rolls.— Since that time, continuous rolls have been devised to admit of several tunes being played successively without any interference on the part of the person who applies the electrical connection and turns on the current. The electrical-attachment device just referred to, with numerous variations, is now largely in use throughout the United States, Canada, and other countries for the entertainment of guests, travelers and others in restaurants, hotels, saloons, railroad stations, and similar public resorts. Some are operated by use of an electric button conveniently placed at tables, hotel desks, and in private apartments. Others start by the insertion of a coin in a metal slot at the side of the instrument.

Electricity as a Tone-Producer.— The foregoing synopsis is intended to show briefly actual conditions in the mechanical harmony field at the time, only recently, when the «Telharmonium» of Dr. Cahill entered the lists as a competitor for the patronage of all such as desired to obtain their music «ready made.» The description of his method given below reveals the fact that Dr. Cahill does not require for his purpose any instrument or apparatus other than a motor, alternator, «mixer,» keyboard, telephone wire, telephone, telephone receiver and sounding horn. This ingenious inventor can claim for his device great simplicity, directness of application, convenience, facility for purposes of distribution, and economy.

The Cahill Method.— In order to obtain, instantaneously, by day or night, on week-days, Sundays, and holidays, an absolutely accurate technical rendering of any published instrumental musical composition, classical or popular, domestic or foreign, one need only be a subscriber to a local telephone system in any large city or town, paying perhaps a trifling additional periodical charge for the privilege of using the Cahill method with horn attachment. This horn once applied, a whole room or hall of listeners may enjoy, without flaw or interruption, a lengthy, acceptable, well-rendered musical program covering, to all intents and purposes, nearly the entire field of instrumental execution. Dr. Cahill is now working on full orchestral application of his general plan.

Theory and Application.— The musical wave theory of the Cahill plan is that of Helmholtz, the famous German scientist. The practical working basis of the method is an electrical plant, with shafts, dynamos, electric attachments, transformers, switch-board, etc., such as may be seen in any electric power-house. There are no visible or audible evidences in the machine room, except probably to the inventor and his assistants, of any ability on the part of the machine in motion to produce harmonious sounds. A large plant, costing $200,000, is now in operation in New York city, with a smaller plant — the original — at the inventor's Holyoke laboratory. Duplicates are to be constructed, from time to time, in many cities.

How Harmonic Sounds Are Produced.— Actual production of harmonic sounds by this system is developed at a keyboard, in a room apart and away from the machinery. The accompanying illustration will give a good general idea of the keyboard arrangement. At this board, when a program is to be played, sits an expert operator — perhaps two. Resembling in appearance the keyboard of a large pipe-organ, the further likeness to that sonorous instrument is suddenly ended, for, whereas the pipe-organ operator plays upon air in the pipes, the Telharmonium expert secures his music from the electric current generated as he proceeds, in many small dynamo-electric machines of the alternating-current type.

The Alternators of Inductors.— These «induction alternators» are simple in construction, yet their development to the point of practical utility, as represented in present performances, occupied the attention of Dr. Cahill during nearly a decade. In the inductors the electrical current passes back and forth with ever-fluctuating force and frequency. Transmitted along the wires to the nearest telephone, the harmonic variations or sound-waves thus created impinge on the telephonic diaphragm and cause the emission of musical sounds corresponding in delicacy, volume, and technical expression with the product of the alternators as they are affected by the key-operator of the player or players at the keyboard.

Keyboard and Motor.— Parts of each alternator revolve. These parts are on shafts, the shafts geared together. Each revolving part has varying individual magnetic poles or teeth and varying individual angular velocity. These eccentric movements combine to produce musical waves throughout a compass of five octaves. In the keyboard operation, the Telharmonium is set in motion by a motor. The interlocked revolving alternator parts or «rotors,» when influenced by motor power. begin to revolve simultaneously, the various currents communicating with the keyboard wires. The depression of any given key closes a circuit on a ground tone, also on such other currents as yield corresponding harmonies.

The Tone-Mixer.— An ingenious and vital operation on the electrical currents before they reach their destination at the telephone end of the entrance, their transformation for blending purposes in what is technically, but uneuphemistically denominated as «tone-mixers,» wherein the various waves of sound are resolved into an acceptable harmonic form. The form of these machines may be judged from the illustration. The actual tone-yield of the tone-mixer is among the most marvelous of Dr. Cahill's inventive achievements. It produces such a vast variety of sounds that the exact imitation of several instruments other than the piano is readily brought forth through expert keyboard manipulation. These imitations include the flute, oboe, bugle, French horn, 'cello, and violin.

Plan of Application to Public Use.— The Cahill scheme in its entirety contemplates, in addition to use of the public telephone system wherever available, a central office connection of cables laid in the streets, thence, by single wires, to private houses, theatres, churches, schools, and wherever else such musical service may be desired. The delivery of the best music at towns, villages, and farmhouses up to 100 miles or more from the central section is now merely a question of perfected details.

The Program.— Regular telephone subscribers. in working out of the plan, are provided with programs of musical compositions to be rendered at certain hours each day by the Telharmonium central station operators. Between the hours indicated, certain selections are «turned on.» To hear those selections, subscribers have only to adjust the horn supplied to them and listen. Those who have already heard the new device in operation describe its tones as «peculiarly sweet and soothing.» At a demonstration in a hotel ball-room at Holyoke, Mass., about a mile from the operating plant, one present said, in an expert opinion subsequently published, that the music «filled the entire room» with «singularly clear, sweet, perfect tones.» «Fullness, roundness, completeness» are three other qualities credited by expert auditors to the Telharmonium.

The Plant.— The central New York Telharmonium station contains, as an initial plant for preliminary practice and service purposes, electrical machinery weighing over 200 tons. The outfit includes 145 of the inductor alternators described elsewhere in this article, each mounted on an 11-inch shaft. The electric machinery stands on a heavy steel girder forming a bedplate more than 60 feet in length.

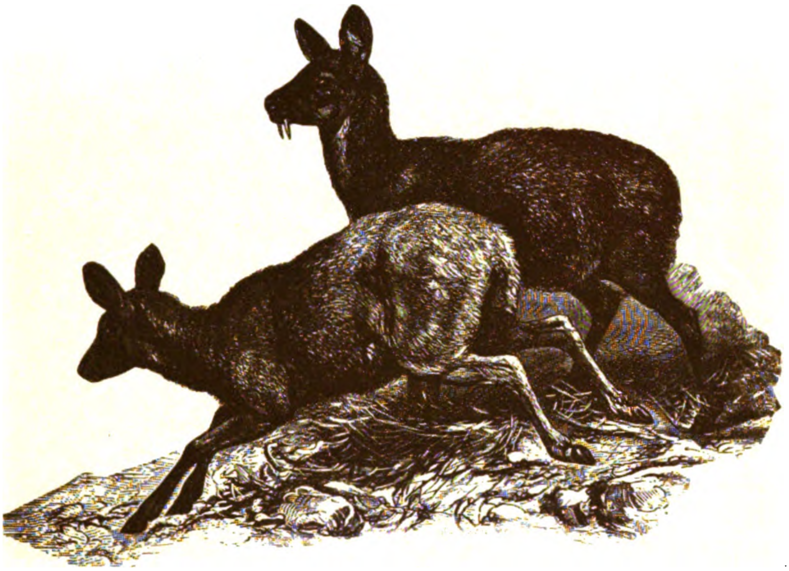
Late Developments.— The first of a series of Telharmonic concerts was held in October, 1906, at the first meeting for the season of the New York Electrical Society. The program which included renditions as from several instruments, also vocal accompaniments, was completely and satisfactorily executed, gaining general approbation. This concert was given at the Telharmonic headquarters. Active preparations are in progress for the outside supply of music. Separate telephone cables are being laid on Broadway. These will be available by tapping for hall, hotel, and house accommodation. The New York Telharmonium plant now ready for service has a capacity to supply 15,000 or 20,000 outlets.

Musical Sand, beaches which emit musical tone or other sound when the sands are pressed under foot or struck together in a bag. They occur throughout the world, notably in the peninsula of Sinai, on the great musical mountain of Jebel Nagous; near Colberg in Pomerania; on the East Prussian coast; in the United States, where there are such sonorous beaches on the Atlantic, on the Wisconsin River (near Kilbourn City, Wis.), on the Mississippi (opposite Carondelet), and on the Pacific coast: in Hawaii, where there are «Barking Sands» on the southwest coast of Kauai; in Africa (Liberia and West Griqualand); in Botany Bay, New South Wales; and in Brown's River Bay, Tasmania. The sound is a mere squeak unless the sand is very dry; then it is musical. Hence the common explanation that the sound is due to the «rubbing together of millions of clean sand-grains very uniform in size» is less likely than the hypothesis that it is caused by the ocillation of the particles which a. prevented by elastic air-cushions from actual contact.

Mu'sick, John Roy, American author: b. Saint Louis County, Mo., 28 Feb. 1849; d. Omaha, Neb., 14 April 1. He was graduated at the Northern Missouri State Normal School in 1874, admitted to the bar in 1877, and until 1882 practiced law at Kirksville, Mo., and elsewhere. Afterward journalism and authorship became his chief occupations. In 1878 he published in 'Potter's American Monthly' his first story, 'Justice Courts,' and among his later works may be mentioned: 'The Banker of Bedford'; 'History Series of Missouri'; 'Calamity Row'; 'Brother Against Brother'; 'The Mysterious Mr. Howard'; 'Hawaii'; 'Our New Possessions'; 'The Ward with Spain'; 'Cuba Libre'; and 12 'Columbian Novels,' dealing with the history of the United States. In these novels were passages which some newspapers described as plagiarisms from Dickens and Saint-Pierre, and in consequence Musick was made the object of much criticism.

Musk, or **Muscovy, Duck.** See Duck.

Musk-deer, a small deer-like animal (*Moschus moschiferus*) of the sub-family *Moschinæ* differing from typical deer in the absence of antlers in either sex, in having only one lachrymal orifice, in the presence of a gall-



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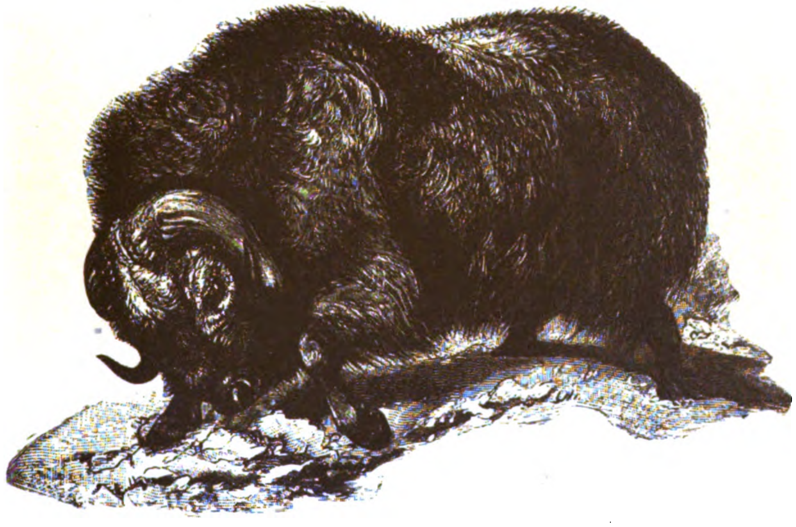

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1. **Musk Deer.** 2. Musk Ox.

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bladder, and, in the male, of the musk-bearing glands to which the animal owes its name. Other peculiarities are the smooth brain, long tusks (canines) of the upper jaw, and the character of the feet, where the "false hoofs" come to the ground. These and other characters led Flower to declare it "an undeveloped deer," — a representative of an ancient type.

The musk-deer is of small size, about 20 inches tall, grayish, marked with obscure stripes on the fore quarters and neck, thick-legged and ungraceful in form, but agile in movement. The species is confined to the highlands of Tibet and northward, where they frequent the pine-woods, going to the heights above them in summer. They dwell alone, or in family parties, are timid and secretive, feeding rarely except at night, and then subsisting partly on roots dug with their great teeth.

The males alone yield the musk secretion, which is furnished by a glandular sac or pouch situated on the abdomen, and averaging the size of a hen's egg. The secretion is resinous and unctuous, and becomes granular and of a dark color when dried. About 190 grains is stated to be the average quantity obtained from a single animal. When the musk-sac is first opened the odor is said by Tavernier to be so powerful that it causes the mucous membrane of the nose to bleed. The bag or "pod" is cut out by the hunters, and its orifices are tied, nevertheless the contents are often found much adulterated. The substance also reaches the market in a granular form, having been scraped off rocks where it has been deposited by the animal. The best comes by way of India and China, and is known as Tongking musk; a poorer quality comes from Siberia. Formerly musk had some value in medicine, but now is used almost wholly by perfumers; and the demand is so great that the animals are now comparatively rare, and the price of musk-pods has greatly advanced over former rates.

A somewhat similar secretion is possessed by many other mammals and reptiles, and in some cases, as of the muskrats (q.v.), is very strong, especially in the mating-season. The biological significance of it, no doubt, is sexual attraction. A similar odor belongs to certain plants. Consult Flower and Lydekker, 'Mammals' (1902).

Musk-ox, a singular ruminant (*Ovibos moschatus*), now confined to the Arctic regions of North America, but once circumpolar, and in Pleistocene times an inhabitant of all Europe and in America as far south as Kentucky. In general appearance it much resembles a large hairy sheep. Its body is clothed in long, brownish hair, with a warm undercoat of wool, very thick and tufted on the neck and shoulders, and elsewhere long and flowing, so that it hangs down almost to the feet. A lighter saddle-shaped patch marks the middle of the back. The tail is short and invisible. The legs are short and strong, and the hoofs of unequal size and shape, the outer being much broader than the inner one. The horns are broad at the base, covering the forehead and crown, much as do those of the Cape buffalo, then curve downward between the eye and the ear and then upward and backward. The average size of the male is that of a small domestic ox. This animal seems intermediate in structure between oxen and sheep, having part of its characteristics bovine and the other part caprine. A thorough exposition of its anatomy by Dr. Lönnberg may be found in the 'Proceedings' of the Zoological Society of London for 1900. The musky odor which belongs to them is not emitted by any special gland, but seems a general emanation, and is not very strong.

In habits these animals are gregarious, each herd numbering from 20 to 30 members. They migrate in winter from the most northern and exposed places to those farther south, or where food is more accessible, and are constantly hunted by the Esquimos as an important source of food. To this is added much destruction by fur-traders, whalers, and explorers, and their numbers are much diminished. Their present winter range is rarely south of the Barren Grounds (q.v.), between Hudson Bay and Great Slave Lake. Their food consists of moss, lichens, herbage and twigs of the dwarf willows and birches which grow in parts of their country. They are extremely wary, and their hunting requires great skill and endurance. Their flesh is good, their hides very useful and from their wool might be woven an admirable cloth could it be obtained in sufficient quantity. Consult books by Arctic explorers and Grinnell, Wister and Whitney, 'Bison, Musk-Ox and Sheep' (1903).

Musk Plant, a popular name for several unrelated plants. The species most cultivated in the United States is *Mimulus moschatus*, of the natural order *Scrophulariaceæ* and a native of the Western States. It is very popular in cool greenhouses and window gardens and, being hardy, in damp, shady places out of doors. In Europe, the name is most applied to *Erodium moschatum* of the natural order *Geraniaceæ*, a native of the Mediterranean region, growing in gardens from annually sown seeds. The name is applied in the West Indies to *Guarea grandifolia*, which is also known as musk wood, and to *Trichilia moschata*, also called musk tree. This last popular name is also applied to a Tasmanian tree (*Olearia argophylla*). An East Indian plant (*Euryangium sumbul*) is probably best known in the markets as musk root. Its starchy roots are used as a substitute for musk in perfumery.

Musk-shrew. See MUSKRAT.

Musk-turtle, or Stinkpot. See BOX-TURTLE.

Musk-wood, a tree (*Guarea grandifolia*) of the tropical American order *Meliaceæ*, so called in the West Indies because the bark smells so strongly of musk that it may be used as a perfume. Although the tree attains timber size the wood contains a bitter resinous substance which unfits it for many purposes. The bark of several trees of this genus is used as an emetic and purgative.

Several other trees and plants give a musky odor, such as the musk-plant, one of the monkey-flowers (*Mimulus*); the grape-hyacinth; the musk-mallow or musk-okra; the starchy root of the Asiatic *Euryangium sumbul*, which is used to adulterate true musk; the Tasmanian musk-tree (*Olearia argophylla*) and others.

Muskegon, mŭs-kē'gŏn, Mich., city, county-seat of Muskegon County: at the mouth of the Muskegon River, on Muskegon Lake, and on the Grand Rapids & I., the Toledo, S. & M., and branches of the Pere M. R.R.'s; about 95 miles northwest of Lansing, and 38 miles northwest of Grand Rapids. Lake Muskegon, upon which the city is situated, is connected with Lake Michigan by a channel 200 feet wide and of sufficient depth for large vessels. This gives the city an excellent harbor for lake steamers, which connect it directly with all the important lake ports. The harbor is clear of ice all the year.

Muskegon was first settled in 1834, although a temporary trading post was established here in 1812. It was incorporated as a village in 1861 and chartered as a city in 1869. The chief manufactures are furniture, curtain rollers, refrigerators, flour, beer, knit-goods, paper, pianos, iron products, chemical engines, tinplate products, electric cranes, leather, and cutlery. It has a large trade in lumber, the manufactures of the city, fruit, celery, vegetables, and farm products. The city has been greatly favored by the numerous donations of one of its own citizens. He has presented a public library, a gymnasium, a manual training school, an endowed hospital, and a square upon which has been erected a soldiers' monument, and several bronze statues. The government is vested in a mayor, who holds office one year, and a council. The waterworks are owned and operated by the city. Pop. (1890) 22,702; (1900) 20,818; (1910) 24,062.

Musket, a small hand-gun with which infantry soldiers were formerly armed. When first introduced, early in the 16th century, it was discharged by means of a lighted match, and was so heavy that it had to be laid across a staff to be fired. To make use of it the soldier required to carry a slow-burning match with him which was apt to be extinguished in wet weather. The wheel-lock followed, the chief feature of which was a wheel made to revolve by means of a spring, and to cause sparks by friction against a flint. The next improvement was the flint-lock proper (about 1625), in which sparks were produced by one impact of a piece of flint on the steel above the priming powder. Musketeers were soon introduced into all armies, and in the beginning of the 17th century infantry consisted of pikemen and musketeers, and all changes in regard to the relative proportion of the two arms were always in favor of the latter. The flint-lock musket was introduced into the British army toward the end of the 17th century, and was the British musket of the days of the Peninsular war and Waterloo, known familiarly as «Brown Bess.» It was superseded by the percussion musket in 1842, this musket being in turn superseded by the rifle. See ARMS AND ARMOR; FIRE ARMS; RIFLE.

Musketoon', a short, thick musket, used in the 18th century but now obsolete; the bore was the thirty-eighth part of its length; it carried 5 ounces of iron or 7½ of lead, which was discharged by an equal quantity of powder.

Mus'ketry, the science and art of shooting with small-arms, especially with the musket or rifle. In connection with the British army there is a musketry school, where officers and non-commissioned officers of infantry and cavalry are trained in musketry.

Muskhogean (mŭsk-hō-gē'ạn) **Stock.** See CREEKS.

Mus'kellunge, Maskinonge, etc., the great pike (*Lucius nobilior*) of the lakes of the interior of North America. See PIKE.

Muskingum, mŭs-kĭng'gŭm, a river of eastern Ohio with a course of about 120 miles wholly within the State. It is formed by the junction of the Tuscarawas and the Walhonding at Coshocton in the county of the same name, and it flows in a general southeast direction through a beautiful and fertile valley to Marietta, where it joins the Ohio. The chief towns on its banks are Zanesville, McConnellsville, and Marietta. It is navigable for 90 miles to Dresden.

Muskingum College, in New Concord, Ohio, founded, under the auspices of the United Presbyterian Church, in 1837. In 1910 there were connected with the institution 28 professors and instructors, and about 475 pupils. There were about 4,000 volumes in the library; the buildings, grounds, and furnishings were valued at $40,000; the productive funds were about $100,000. The annual income, which includes tuitions, interest from productive fund, fees, etc., amounted to about $45,000. The courses lead to the degrees of A.B. and B.S.

Musk'melon, or **Cantaloupe.** See MELONS.

Muskogi Indians. See CREEKS.

Muskoka, mŭs-kō'kạ, Can., a county of Ontario, bordering on Georgian Bay, the name also being borne by a beautiful lake and river, and comprehensively applied to the extensive region lying between Georgian Bay on the west, Lake Nipissing on the north, Ottawa River on the east, and Lake Simcoe on the south. The capital of the county is Bracebridge on the Grand Trunk Railroad, pop. about 2,500. The region with between 800 and 1,000 lakes and smaller bodies of water, chief of which are Muskoka, Rosseau, and Joseph lakes, all abounding in fish; several rivers and picturesque waterfalls, notably High Falls and South Falls on the Muskoka River and Bridal Veil Falls on the Shadow River, and extensive forests filled with game, is a paradise for sportsmen which is become more widely known and visited every year. During the summer steamboats ply on the principal lakes connecting with the Grank Trunk and Canadian Pacific R.R.'s.

Muskrat, or **Musquash,** an aquatic rodent (*Fiber zibethicus*) numerous throughout North America, and yielding a valuable fur. It is a member of the rat family (*Muridæ*), and is, in effect, a gigantic vole or meadow-mouse, with a tail flattened sideways into a powerful swimming instrument, and fringed with stiff hairs; the hind feet are set obliquely to the leg; the ears are very small and buried in fur, the muzzle is blunt and furry; the palms and soles are naked and fringed with hairs. The average total length is about 21 inches, of which the tail is more than a third, measuring as long as the body without the head. The color varies above from almost black to pale brown; sides of head and body chestnut-brown; under-fur bluish gray; feet dark brown; tail black. Those of the Rocky Mountain region are smaller and paler than eastern ones. The musky odor of these animals is due to a thick fluid secreted in two small glands near the generative organs, which imparts a taint to the flesh that makes it unpalatable to most persons.

These animals reside along small streams, and in swampy places generally, being most abundant around Chesapeake Bay and in the marshy lakes of the upper Mississippi region and northward to Hudson Bay. Where the banks have some elevation they form extensive burrows, which have entrances below the surface of the water, and gradually ascend till they terminate in a chamber above the level of high water. These burrows are most frequently made under the roots of trees, or in other situations of difficult access. The excavations are of great injury to artificial embankments along canals and rivers, by permitting the water to undermine and to make large breaches in them, and in some parts of the country they do serious damage to canal embankments and river-dikes. When, however, these animals inhabit low and marshy situations, they construct conical houses usually surrounded by water, not unlike those of the beaver but smaller, composed of reeds, etc., mixed with clay. These houses have subterranean passages leading to them, and are inhabited by many individuals during the winter; but in the warm weather they desert them entirely, and dwell in pairs in a bank-burrow while they rear their young. The houses contain a large, smooth-walled chamber, above the water-line; and when frozen are sufficiently solid to form a protection against all but the largest carnivora; but they are usually destroyed and swept away in the spring floods, so that a new house is erected every season.

The muskrat feeds mainly upon aquatic vegetation, especially the rootstocks and basal parts of stems, and is especially fond of the pond-lily. These it brings to the shore to eat, almost always during the night, for it is essentially nocturnal, although often seen abroad in the daytime. It is very fond of mussels, and brings great quantities of these ashore, always, when possible, at the same place, so that piles of their shells accumulate to indicate favorite feeding-spots. In summer the muskrats feed on shore-herbage somewhat, and frequently go some distance to get a meal of growing corn, garden vegetables or fallen fruit. They are accused also of occasional fish-catching, and are unwelcome in waters devoted to fish-culture. Because of the commercial value of its fur and of its destructiveness in some places, or for amusement, the muskrat is incessantly persecuted by man, as well as preyed upon by many natural enemies — minks, wolverines, foxes, wildcats, badgers, wolves, birds of prey, water-moccasins, snapping-turtles, pikes and others, which capture many young and some adults. Nevertheless they are so secretive and so prolific, and have found so many advantages in the civilized parts of the country, that they survive even in the most thickly settled districts, and are likely to maintain their numbers indefinitely. They produce from three to nine young at a birth, and often breed two or three times a year.

The fur of the muskrat is dense and soft, but inferior to that of the beaver. It was formerly little esteemed, but during the last century has come more and more into use, beginning with a demand early in the 19th century for making «beaver» hats. When this industry was ended by the introduction of silk hats the demand diminished, but revived again, until, about 1870, London was receiving about 4,000,000 skins annually, besides some 500,000 consumed in America and 1,500,000 sent to Germany, principally Leipsic. The price then began to fall, but the product amounted in 1903 to about 5,500,000 pelts. The best «No. 1 black» skins averaged in London, in 1903, about 30 cents.

«Muskrat fur,» according to a recent authority, «is used more extensively in Europe than in America, the Russians and Germans being especially large consumers. It is employed in making gloves, collars, caps, capes, muffs, trimmings, linings, etc., and is made up either natural, plucked, plucked and pointed, or plucked and dyed black or various shades of brown. Large quantities are used as linings for overcoats and long wraps, from 40 to 60 being necessary for each garment. Sometimes the under parts are used separately for this purpose, the natural white color being quite effective. The skins of young animals are especially suited for linings. The unplucked skins are frequently dyed to imitate mink, and sold as 'Alaska mink,' 'water mink,' or 'black mink.'»

Muskrats are taken by shooting, spearing in winter (through their houses, or through the ice), or, most numerously, by trapping. Ordinary steel traps are used, placed under the water inside a broken house, or in a runway or landing place, baited with an apple, or bit of parsnip, and often scented with musk or an aromatic oil, and fastened by a heavy chain so arranged, if possible, as to lead the animal to drown itself in its struggles. In certain districts, as along Chesapeake Bay, men make a regular business of trapping muskrats in winter; and even own, or rent, large spaces of marshland for that purpose.

The books of Audubon, Godman, Hearne, Richardson, Merriam and all general writers on American mammals should be consulted; also Stone and Cram's 'American Animals' (1902); Herrick, 'Mammals of Minnesota' (1892); and the files of the 'American Naturalist' and of 'Forest and Stream.'

Muskrat, Indian, a name among the British residents in India for a shrew (*Crocidura cærulea*), about the size of the common rat, which comes into houses at night hunting for cockroaches and similar insects, and makes its presence known by occasional shrieks. This animal emits a peculiarly strong and penetrating odor of musk, which clings to everything the little beast touches, and arises from two large musk-glands beneath the skin of the side of the body a short distance behind the forelimbs. Consult Blanford, 'Mammalia of British India' (1888).

Mus'lim, or **Moslem**. See MOHAMMEDANISM.

Muslin, a fine cotton fabric. The name is said to be derived from the city of Mosul in Mesopotamia. The texture of muslin is usually plain, but sometimes adorned with figured patterns. The manufacture of muslin was introduced into Europe from India about the end of the 17th century, and it is now largely carried on both in Great Britain and in France.

Mus'quash, a name in the Canadian Northwest for the local muskrat (q.v.).

Mussel-pecker, a bird, the oyster-catcher (q.v.).

Musselburgh, mŭs'l-bŭr-ō, Scotland, a town and seaport of Midlothian, 6 miles east of Edinburgh, on the Firth of Forth, at the mouth of the Esk, which divides it into two parts, Musselburgh proper and Fisherrow. It has noted golf-links, a bridge of Roman origin, and a curious old tolbooth built in 1590, out of materials from the celebrated Chapel of Loretto. The chief manufactures are leather, paper, and fishing-nets by machinery. There is a fishing population of about 1,100. The battle of Pinkie, in 1547, was fought in the vicinity. Pop. about 13,000.

Mussels, Fresh-water. See FRESH-WATER MUSSELS.

Mussels, Marine. The marine mussels belong to a family (*Mytilidæ*) of bivalve mollusks which have the anterior retractor muscles very small, the posterior large, and the two valves of the shell equal and covered by a thick horny layer. Numerous species occur in all seas and, because of the comparative delicacy of their flesh, and their habit of forming immense beds, many are of commercial importance. Foremost in this respect is the edible mussel (*Mytilus edulis*) which has a smooth, dark-colored, wedge-shaped shell with the umbos or beaks exactly at the hinge end. This species is circumpolar in its distribution, and on our Atlantic coast extends southward to North Carolina. Wherever rocky reefs, piles, or other suitable objects for attachment occur at low water, combined with currents for bringing food, this mollusk multiplies into extensive colonies. In Europe it is valued much more highly than in this country, where it is chiefly used for bait, although considerable quantities are canned in New York. Besides the fisheries on natural beds this mussel is regularly cultivated in France by methods akin to those used in European oyster culture. The genus *Modiola,* containing the so-called horse-mussels, is distinguished by the more oblong shell inflated toward the hinge end, from which the umbos, though close, are quite distinct. The best known one (*M. modiolus*) is a large species distinguished by the nearly unribbed surface and the coarse hairy epidermis. It has nearly the distribution of the *Mytilus,* and abounds in the north on rocky shores at low water and below to a considerable depth. *Modiola plicatula* is distinctly ribbed and has a thinner epidermis. This is an American species which ranges from Nova Scotia to Georgia and is extremely abundant at low water on the mud-flats of the New Jersey coast, where it is doubtless effective in the upbuilding of sedimentary areas. These two species are less valued for food than the *Mytilus,* but are largely utilized in certain localities as fertilizers. Consult: Goode, ‘Fishery Industries of the United States’ Sec. 1 (1884); Cooke, ‘Mollusca’ (1895).

Musset, Louis Charles Alfred de, loo-ē shärl ăl-frā dė mü-sā, French poet, novelist, and dramatist: b. Paris 11 Dec. 1810; d. there 2 May 1857. After trying various professions and being dissatisfied with them all he, about 1830, gave himself up wholly to literature, and in that year published poems, ‘Contes d'Espagne et d'Italie.’ In 1831 appeared a new collection entitled ‘Poésies Diverses,’ and in 1833 a third, bearing the general title ‘Un Spectacle dans un Fauteuil,’ in which the chief pieces are a comedy of a light and delicate grace called ‘A quoi Revent les jeunes Filles,’ and a poem, ‘Namouna,’ written after the manner of Byron. His ‘Confession d'un Enfant du Siècle’ (1836) is a gloomy autobiographic novel, containing the analysis of a diseased state of mind, all the phases of which the author had studied in himself, and which had already revealed itself in some of his earlier poems. The same settled melancholy also distinguishes his ‘Rolla,’ ‘Une bonne fortune,’ ‘Lucie,’ ‘Les Nuits,’ ‘Une Lettre à Lamartine,’ ‘Stances à Madame Malibran,’ ‘L'Espoir en Dieu,’ and other poems, written some before and some after the ‘Confession’ published in the ‘Revue des Deux Mondes.’ The prose tales he contributed to the same periodical are full of grace and feeling. The same qualities are found in his comedies and *proverbes* (short dramatic pieces), published in 1840. One of these short pieces ‘Un Caprice,’ was performed at the Théâtre Français in 1847, and although not composed in accordance with the customs of the stage, succeeded by the truth of the characters and the charm of the dialogue. De Musset was made librarian of the department of the interior in 1838, of which post he was afterward deprived, and of the department of public instruction in 1855. In 1852 he was admitted a member of the French Academy. Among his dramatic works perhaps the best is ‘Les Caprices de Marianne,’ a classic of the Théâtre Français repertory. He has been ranked after Hugo and Lamartine as the third French poet of the 19th century. Consult biographies by Paul de Musset (1877; Eng. trans. by H. W. Preston 1887), and Barine (1893).

Mus'sey, Reuben Dimond, American surgeon: b. Pelham, N. H., 23 June 1780; d. Boston 21 June 1866. He was graduated at Dartmouth in 1803; studied medicine at the University of Pennsylvania; practised in Salem, Mass.; taught in the Dartmouth medical school 1814–20 and 1822–38, at Bowdoin 1833–5, at Ohio Medical College 1837–50, and at Miami Medical College, which he founded, 1851–8; and spent the last eight years of his life in practice in Boston. He was a famous operator, the first to remove the shoulder blade, or to tie both carotid arteries, and successful in his operations for stone, for removing ovarian tumor, for strangulated hernia, and in subcutaneous deligation in varicocele. Mussey wrote ‘Health: Its Friends and Its Foes’ (1862).

Must, the juice of the grape, which by fermentation is converted into wine. In the wine countries this unfermented sweet must is distinguished from the sour must or unripe wine of a year old.

Mus'tang. See BRONCO.

Mus'tard, a genus of annual, biennial and perennial herbs (*Brassica*) of the natural order *Cruciferæ.* The species, of which about 100 have been described, are characterized by yellow four-petaled flowers, linear or oblong pods containing one row of seeds. All are noted for their more or less biting flavor for which some are valued as esculents. In a generic sense, cabbage, kale, cauliflower, turnip, and other vegetables are mustards, but specifically the name is restricted to a few species of which the following are the most important: Black mustard (*B. nigra*) so called from its dark brown seeds, white mustard (*B. alba*) the seeds of which are yellowish, Indian mustard (*B. ramosa*), and *B. arvensis.* These are all cultivated for their seeds which when ground constitute the popular condiment, mustard. Sometimes flour and turmeric are added to the mustard to dilute and color it. The young plants are often eaten like spinach or as a salad. They may be easily obtained from seed sown in any garden soil.

Mustard Oil. See OIL OF MUSTARD.

Mustil'idæ. See FUR-BEARING ANIMALS.

Mut, moot, in Egyptian mythology, a goddess of heaven and queen of earth, the wife of Ammon and the mother of Chons. Her name signifies «mother.»

Muta Nzige, moo'tä nzē'gä, Africa, the local name for a lake discovered by Stanley in 1876, explored by him in 1889, and renamed the Albert Edward Nyanza (q.v.).

Mutanabbi, moo-tä-näb'bē (Arabic, «the alleged prophet»), Arabian poet: d. Kufa, Asiatic Turkey, 965 A.D. He published a ‘Divan,’ or collection of verse, a German translation of which exists (‘Motenebb der grösste arabische Dichter’ 1824).

Muta'tion Theory, a hypothesis of organic evolution which accounts for development by sudden changes or «leaps» rather than by slow and successive degrees; sometimes styled saltatorial evolution. It is illustrated by «Sports» (q.v.),— sudden aberrations from the normal, more familiar in botany than in zoology, but often occurring there. This mode of evolution has always been regarded as effective to some degree, but its general application was urged by Prof. Hugo De Vries in a work ‘Die Mutationstheorie,’ published in 1901.

Muther, moo'tĕr, **Richard,** German art historian: b. Ohrdruf, Germany, 25 Feb. 1860. He was educated in the University of Heidelberg and the conservatory at Munich and devoted his attention to the history of art in which subject he has been professor at the University of Breslau since 1895. He has published: ‘Anton Graff’ (1881); ‘Gothic and Early Renaissance Illustrations of German Books’ (1884); ‘Meisterholzschnitte aus den Jahrhunderten’ (1887); ‘The History of Modern Painting’ (1893); ‘A Century of French Painting’ (1901); ‘Geschichte der englischen Malerei’ (1902); etc.

Mutineers of the Bounty, The, a work published in 1870 by Lady Diana Belcher. It is an account of a unique settlement on a South Sea island. In 1789 H. M. S. Bounty, Lieutenant Bligh commanding, while sailing in the South Seas was captured by mutineers, and the commander with 18 of the crew were set adrift in the cutter. The ship sailed to Tahiti. There dissensions arose among the mutineers. Half of them sailed away, and all trace of them was lost for many years. Some 20 years later, a British vessel happened accidentally to stop at Pitcairn's Island. The officers were amazed to meet young men who spoke excellent English, and to find a prosperous and happy Christian community, largely descendants of the mutineers. It was learned that the Bounty sailed directly from Tahiti to Pitcairn's Island, where the mutineers made a settlement. One of them, John Adams, remembering his early Christian training, established the principles of the Christian religion firmly in this peculiar community, which, maintaining its essential characteristics, still occupies Pitcairn and Norfolk Islands.

Mutiny (Fr. *mutin,* refractory, stubborn; *mutiner,* to rise in arms). Two hundred years ago the word mutiny was often used in describing insurrection or sedition in civil society; but it is now applied exclusively to certain offenses by sailors and soldiers. Properly it is the act of numbers in resistance of authority; but by statutes, certain acts of individuals are declared to be mutiny. The act of Congress of 3 March 1835 defines mutiny or revolt in the following language:

> If any one or more of the crew of any American ship or vessel on the high seas, or on any other waters within the maritime and admiralty jurisdiction of the United States, shall unlawfully, wilfully, and with force or by fraud, threats, or other intimidations, usurp the command of such ship or vessel from the master or other lawful commanding officer thereof; or deprive him of his authority and command on board thereof; or resist or prevent him in the free and lawful exercise thereof; or transfer such authority and command to any other person not legally entitled thereto; every such person so offending, his aiders and abettors, shall be deemed guilty of a revolt or mutiny and felony.

The same statute provides for endeavors and conspiracies to excite mutiny. In construction of the act it has been held that mere disobedience of orders by one or two of the seamen, without any attempt to excite a general resistance or disobedience, and insolent conduct or language toward the master or violence to his person, if unaccompanied by other acts showing an intention to subvert his authority as master, are not sufficient to constitute the offense of endeavoring to excite mutiny. An indictment for this crime, it is said, must set forth a confederacy of at least two of the men to refuse to do further duty, and to resist the lawful commands of the officers. The offense of making a revolt was by the act of April, 1790, punishable by death. By the act of 1835, it is punished by fine not exceeding $2,000, and by imprisonment and confinement at hard labor for not more than 10 years, according to the nature and aggravation of the offense; while attempts to excite a mutiny are punishable by fine not exceeding $1,000, or by imprisonment not exceeding five years, or by both. Mutinous conduct in the army and navy is provided for by the acts of 10 April 1806 and of 23 April 1800. By the former, «any officer or soldier who shall begin, excite, cause, or join in any mutiny or sedition, in any troop or company in the service of the United States, or in any party, post, detachment, or guard, shall suffer death, or such other punishment as by a court martial shall be inflicted.» Under the latter, «if any person in the navy shall make, or attempt to make, any mutinous assembly, he shall, on conviction thereof by a court martial, suffer death.» The law of mutiny in Great Britain is similar to the United States statute.

Mu'toscope, a mechanical apparatus for exhibiting instantaneous pictures of moving objects taken by the kinetograph or similar instrument. Photographic prints from the series of pictures thus obtained are mounted in consecutive order around a cylinder standing out like the leaves of a book. When this cylinder is slowly revolved, the picture cards being held back by a stop, and allowed to snap past the eye one by one, as one thumbs the leaves of a book, an apparently moving picture is the result, and it is difficult to realize that the picture is not endowed with life.

Mutsuhito, the personal name of the emperor of Japan, who in the traditional line of mikados ranks as the 123d. Son of the emperor Komei, by one of the ladies of the imperial harem, he was born 3 Nov. 1852 and succeeded to the throne on the death of his father 3 Feb. 1867. He was reared in Kioto amid the tumultuous events leading to the *coup d'etat* of 3 Jan. 1868, when the leaders of the Progressive Movement, about 55 in number, took possession of the imperial palace and of the person of the emperor and began rebuilding the empire. Mutsuhito was taken into the headquarters of the military garrison long maintained in Kioto at the castle of Nijo to overawe the throne and court, and there took the oath, drafted by Viscount Uri of Echizen, to establish representative government, abandon worthless ancient traditions, make ability and not rank the basis of appointment to office, and to seek throughout the world for men of talent to assist in the work of transforming Japan. Under the new leaders Mutsuhito imbibed Western ideas and became a devoted champion of progress. He accepted the treaties with foreign powers and gave audience to the envoys. At Okubo's suggestion, he made himself visible in public life and moved the capital to Yedo, which was named Tokyo. On 9 Feb. 1869, in Kioto, he married the Princess Haruko of the house of Ichijo, who from that time forth became not merely an invisible consort of the country's ruler, but an empress in something of the modern and occidental style and view. The term mikado, so appropriate, historical and characteristic, is not in common native use, the people calling him Tenshi, Son of Heaven, or Shu-jo, Supreme Master. Though by etiquette and tradition without family name and his personality kept necessarily in shadow, Mutsuhito is a man of marked ability and decided opinions, though the necessities of this not yet wholly un-Oriental realm require that the mystery play of his alleged divine origin be kept up a little longer. The imperial silver wedding and 50th birthday as well as the Crown Prince's nuptials have been celebrated with national rejoicings and the issue of commemorative postage stamps, on which, however, no effigy or portraits yet appear. Article III. of the Constitution declares that "The Emperor is sacred and inviolable," and his character and doings are never criticised or openly discussed by natives of Japan. Yoshihito, third son of the emperor by Madame Yanagawara Aiko, born 31 Aug. 1879, was proclaimed heir to the throne 31 Aug. 1887, and married on 10 May 1900 to the Princess Sada, third daughter of Prince Kujo. Of this union two male children have been born, Hirohito, 1901, and Haruhito in 1902, thus apparently solving the problem of the abolition of polygamy in the palace.

William Elliot Griffis,
Author of 'The Mikado's Empire.'

Mutton-bird, a sailors' name for the shearwater (q.v.).

Mut'tra, India, the chief town of a district of the United Provinces, on the Jamna, 36 miles northwest of Agra. It is an old Hindu city, and is identified by some with the Methora mentioned by Arrian. It is regarded as the birthplace of Krishna, and is a great centre of Hindu devotion, being resorted to by large numbers of pilgrims. It has numerous temples, mosques, bathing ghats, a museum, and the 17th century observatory of the Hindu astronomer Jey Singh. Pop. about 60,000.

Muyscas, mü-ē'skä. See Chibchas.

Muzaffar-ed-Din, moo-zä-fèr'ĕd-dēn', Shah of Persia: b. Teheran 25 March 1853; d. there 9 Jan. 1907. He was governor of Azerbaijan; succeeded his father, Nasr-ed-Din (q.v.), 1 May 1896; was largely influenced by European civilization and politically by France and Russia; and visited Europe several times; in 1900 was attacked by an anarchist named Salson in Paris; and in 1902 again visited western Europe and England.

Mužáková, mü-zhä-kō'vä, **Johana**. See Svetla, Karolina.

Muziano, Girolamo, jē-rō-lä'mō moot-sē-ä'nō, commonly known as Bressano, Italian painter: b. Aquafredda, near Brescia, 1528; d. Rome 27 April 1592. He was a pupil of Romanino (see Romanino Girolamo) and of Titian at Venice, and subsequently imitated Michelangelo. He was a skilled mannerist who could paint in any style while possessing none of his own. Among his most successful pictures are: 'The Taking Down from the Cross,' in the Borghese Gallery, Rome; 'The Gift of the Apostolic Keys,' in the Vatican. There are also some frescoes of his still to be seen in the Vatican.

Mycale, mĭk'ạ-lē, Asia Minor, the classical name of the modern Samsun, a mountain of south Ionia, with the promontory of Cape Santa Maria opposite the island of Samos as its seaward termination.

Mycenæ, mī-sē'nē, Greece, an ancient city of Argolis in the Peloponnesus, six miles northeast of Argos, built on a steep hill dominating the passes to Corinth. Its ruins since Schliemann's excavations in 1876 have yielded an abundance of archæological treasures of the greatest value and interest, illustrating and revealing the distinctive Mycenæan period of civilization, which preceded the culminating era of Hellenic culture. Mycenæ is said to have been founded by Perseus, and before the commencement of the Trojan war was the residence of Agamemnon, in whose reign it was regarded as the leading city in Greece; it was also the scene of the domestic tragedies of Atreus (q.v.). It declined in importance after the invasion of the Dorians, but its cyclopean walls, citadel, and other features, chief of which are the Lion's Gate, and the vaulted building of megalithic architecture called the Treasury of Atreus (q.v.), stood through succeeding centuries, and still stand, as monuments of its ancient grandeur and importance. Consult: Schuchhardt-Sellers, 'Schliemann's Excavations' (1891); Hall, 'The Oldest Civilization of Greece' (1901); Tsountas and Manatt, 'The Mycenæan Age' (1897).

Myeli'tis (from Greek μυελός; marrow), an inflammation attended with more or less softening of the substance of the spinal cord. It may be acute or chronic. Some of the maladies formerly ascribed to chronic myelitis are now known to be due to chronic induration and thickening (sclerosis). The most common causes of myelitis are: irritation of the cord by fractured, dislocated, or diseased vertebræ, by the pressure of a tumor, or by hemorrhage into its substance. The disease is aggravated by intemperate habits. It begins usually with pain or other uncomfortable sensations in the spine or extremities, and fatigue, followed by an uncertain gait, paralysis, and very frequently death. If the inflammation involves the upper part of the cord above the origin of the respiratory nerves, respiration is interfered with and death results from asphyxia. If the inflammation exists lower down, in addition to the loss of motor power in the extremities the bladder and rectum may be paralyzed, the evacuations are discharged involuntarily, and death occurs from exhaustion. The tendency of the inflammation is to spread.

Myer, mī'ėr, **Albert James,** American meteorologist: b. Newburg, N. Y., 20 Sept. 1827; d. Buffalo, N. Y., 24 Aug. 1880. He was graduated from Hobart College in 1847 and from the Buffalo Medical College in 1851 and in 1854 became a surgeon in the United States army. While on duty in Texas he devised a signal system consisting of flags by day and torches at night, so simple yet so ingenious that it has been adopted by the armies of the world. He was in command of the signal corps in 1858–60 and in the latter year was commissioned major and appointed chief signal officer of the army. He served in the Civil War in 1861–3 and then took charge of the signal office at Washington and introduced his system at West Point. He was promoted brigadier-general in 1865 and soon afterward retired from the army. He was engaged in the preparation of his book on the signal system and in meteorological investigations at Buffalo until 1870 when he was appointed to take charge of the meteorological observations under the government. The work of the weather bureau was soon recognized as important and was widely extended under General Myer's direction, 300 stations being established before his death. He was United States delegate to the International Congress of Meteorologists at Vienna in 1873 and in 1879 to that held at Rome. He published 'A Manual of Signals for the United States Army and Navy' (1868).

Myers, mī'ėrz, **Ernest James,** English poet, brother of F. W. H. (q.v.): b. Keswick, Cumberland, 1844. He was called to the bar in 1874, but has never practised. He has published: 'The Puritans' (1869); 'Poems' (1877); 'Defence of Rome and Other Poems' (1880); 'Judgment of Prometheus and Other Poems' (1886); etc.; besides translating the odes of Pindar (2d ed. 1884).

Myers, Frederic William Henry, English author: b. Duffield, Derbyshire, 6 Feb. 1843; d. Rome, Italy, 17 Jan. 1901. He was educated at Cambridge, was classical lecturer there at Trinity in 1865–9, and was school inspector from 1872 until his death. In 1882 he assisted in founding a Society for Psychical Research, of which at the time of his death he was president. He was best known as an essayist of much interest, but had also done some work in verse. Among his publications are: 'St. Paul' (1867; new ed. 1879), a poem; 'Wordsworth' (1880), in 'English Men of Letters'; 'Renewal of Youth, and Other Poems' (1882); 'Essays, Modern and Classical' (1883); 'Phantasms of the Living' (with Gurney and Podmore, 1886); 'Science and a Future Life' (1893); and the massive 'Human Personality and its Survival of Bodily Death' (1901).

Myers, Mordecai, American soldier and official: b. Newport, R. I., 1776; d. Schenectady, N. Y., 20 Jan. 1871. On the breaking out of the War of 1812 he enlisted and became a major in the 30th infantry. For a time he was a merchant in Richmond, Va., when he removed to New York. His later life was passed in Schenectady, N. Y., where he served for two years as mayor and for six years in the legislature as member for that district. He held a prominent place in the Masonic fraternity, having been elected grand master and grand high priest of Royal Arch Masons of the State of New York.

Myers, Philip Van Ness, American historian: b. Tribes Hill, N. Y., 10 Aug. 1846. He was graduated from Williams College in 1871 and studied at Yale in 1873–4. He then traveled for three years in Europe and South America, and in 1879–90 was president of Farmers' College, Ohio. He was professor of history and political economy at the University of Cincinnati in 1890–1900, and has published: 'Life and Nature Under the Tropics' (1871); 'Mediæval and Modern History' (1889); 'History of Greece' (1897); 'The Middle Ages' (1902); etc.

Myers, Theodore Walter, American banker: b. New York 11 Jan. 1844. On the breaking out of the Civil War he was appointed captain of the Third regiment, Sickles' brigade; and later was captain of the Ninth regiment, New York National Guard, being connected with the City Guard for many years. In 1864 he entered Wall Street, became a member of the Stock Exchange, and after being associated with various firms, in 1884 organized the bank of Theodore W. Myers & Company. In 1887 he was appointed park commissioner and treasurer of the department. In 1888–91 he served as city comptroller, with such success as to be renominated and re-elected by both Republicans and Democrats for term of 1891–3. During his term of office he negotiated a loan of $14,000,000 for the city at the surprisingly low rate of 2½ per cent.

Myg'ale, the technical and book-name of a species of trap-door spider (*Mygale avicularia*) which has been known to catch small birds and kill them. It is a native of Surinam, Brazil, and adjoining regions. It is the largest of all the spiders, being very stout, with thick, hairy legs. It builds its nest in trees. Similar species are brought into our ports in bunches of bananas. The fact that the bird-spider will actually kill birds and suck their blood was asserted by Madam Merian in 1705. Her statements were received with doubt, but long after were verified by Bates. The specimen he observed on the Amazon River was nearly two inches in length, the legs expanding seven inches. He saw the monster on a tree-trunk beneath a deep crevice in the tree, across which was stretched a dense white web. «The lower part of the web was broken, and two small finches were entangled in the pieces; one was quite dead, the other was still living and was smeared with the filthy liquor or saliva exuded by the monster.» The natives call them *aranhas caranguejeiras*, or «crab-spiders.» The hairs on the body and legs come off when touched, and «cause a peculiar and almost maddening irritation.» This, Bates thinks, is not due to any poisonous quality residing in the hairs, but to their being short and hard, and thus getting into the fine creases of the skin.

Myia'sis, a condition caused by the larvæ of flies. House-flies may affect the skin of man by depositing eggs in wounds and on ulcerations, or may invade the external cavities of the body. The eggs hatch, and the maggots cause much local irritation and symptomatic fever; or in the case of the bot-fly (q.v.), penetrate the skin deeply and produce large abscesses. The maggots, as a rule, do not penetrate other tissues. The principal flies that infect wounds, etc., are the flesh-fly (blue-bottle), blow-fly, screw-worm fly, and house-fly (qq.v.). Internal myiasis may result from swallowing the eggs of flies, when the resulting larvæ are got rid of by vomiting or purgation. Consult Howard, 'The Insect Book' (1901).

Mylitta, mĭ-lĭt'ta, an Assyrian goddess, identified by the Greeks with Aphrodite. She was, as goddess of the moon, the female principle of generation.

My'lodon, a genus of extinct edentate mammals, of sloth-like structure and large proportions, the ground sloths, the remains of which occur along with those of the Megatherium and Megalonyx, in the recent or post-Tertiary deposits of South America. In size the *Mylodon robustus* — the most familiar species — attained a length, in some instances, of 11 feet. See MEGATHERIUM.

Myna. See MINA-BIRD.

Myo'pia, nearsightedness. See SIGHT, DEFECTS OF.

Myosin, a proteid substance, usually classed as a globulin (see GLOBULINS), which separates from muscle plasma after death, in the form of a clot, which is analogous to the clot of fibrin that is formed under similar circumstances in blood. It does not exist in the living muscle, being there represented by two other proteids called myosinogen and paramyosinogen, respectively. The stiffening of the muscles after death (technically known as the «rigor mortis») is due to the formation of the myosin clots in the cells of the muscles.

Myoso'tis. See MOUSE-EAR.

Myriap'oda, a group formerly recognized among the arthropodan animals, but now known to be unnatural and hence abandoned. It included the groups of *Chilopoda*, or centipedes, and the *Diplopoda*, millepeds or galley-worms. The features common to all are the elongate worm-like body consisting of a head, and behind this the trunk of numerous similar leg-bearing segments, not divided into thorax and abdomen. Closer analysis shows that the chilopods are somewhat closely related to the true insects, while the diplopods form a distinct group of doubtful position. In the chilopods the head bears a pair of groups of simple eyes, a pair of antennæ and three pairs of jaws (mandibles, maxillæ, labium), while the first pair of trunk appendages becomes connected with the head and serve as poison-jaws. The trunk-segments are all similar, and each bears a pair of legs, the number of segments ranging from 15 to 170 or more. The body-segments are flattened and the reproductive openings are at the hinder end of the body. Most of the chilopoda are carnivorous. The most noticeable members of the group are the centipedes (*Scolopendridæ*) of the tropics, some of which are nearly a foot in length and have considerable poison powers. See CENTIPEDES.

In the diplopoda the head bears but two pairs of jaws (mandibles and lower lip or gnathochilarium), while the trunk-segments are usually circular in section, and each, except a few near the head, bears *two* pairs of legs, an exception to the otherwise universal rule among arthropoda of a pair of legs to a somite. The range of segments is even greater than in the chilopods, there being 9 in *Pauropoda* and 200 in some *Polyzoindæ*. The reproductive organs lie ventral to the intestine, and the external openings are a little behind the head. The *Diplopoda* live mostly upon decaying vegetation. For protection they rely upon the very thick and hard walls of the bodies, and in some species upon peculiar stink glands which open on the sides of the body. See MILLEPED.

The Myriapods appear in the Devonian rocks and they are found in all parts of the world to-day. Most of the American species are described in Bollman's 'Myriapods of America' (United States National Museum, 1893).

Myricin, a substance formed by the combination of palmitic acid with an organic radical known as «myricyl.» It has the chemical formula $C_{46}H_{92}O_2$, and occurs in beeswax, forming the chief portion of that part of the wax which is insoluble in alcohol. Myricin melts at 162° F., is readily saponified by alcoholic potash, and may be obtained in the form of feathery crystals by deposition from its solution in ether.

Myr'ioscope, a variation of the kaleidoscope (q.v.). A square box has a sight-hole in front, and at the rear are two plane mirrors which are arranged at a suitable angle. On horizontal rollers is a piece of embroidered silk or other ornate fabric, which is moved by means of a crank-handle on one of the rollers. This causes a pretty display when the ornamental figures are multiplied and thrown into geometrical apposition.

Myristic Acid, an organic acid occurring in the form of a glyceryl ether in nutmeg butter, from which it may be prepared by saponification and subsequent distillation at a pressure materially below that of the atmosphere. It has the chemical formula $C_{14}H_{28}O_2$, and is insoluble in water. It is very soluble in hot alcohol, however, from which it separates, upon cooling, in the form of lustrous laminæ, melting at 129° F. A number of compounds of myristic acid with the metals are known, as well as several ethers and other organic compounds.

Myrmidons, mèr'mĭ-dŏnz, a former people on the southern borders of Thessaly, who accompanied Achilles to the Trojan war. They were said to have received their name from Myrmidon, a son of Zeus and Eurymedusa. They are said to have emigrated into Thessaly under the leadership of Peleus.

Myrob'olans, the dried fruits of various species of East Indian trees, all having more or less astringent properties. They are imported into Britain for dyers and tanners, especially the latter. The trees are of the genus *Terminalia,* order *Combretaceæ,* the chief being the belleric myrobolan (*T. bellerica*), and the chebulic (*T. chebulica*).

My'ron, Greek sculptor: b. Eleutheræ, a seaport of Bœotia, about 450 B.C. He was, along with Phidias and Polycletus, a pupil of Ageladas, the founder of the Peloponnesian school of sculpture, and made his renown at Athens as a versatile and masterly worker in bronze, silver, and every other art material. He executed statues of gods, heroes, and especially of athletes, many of which were set up in the temples at Delphi and Olympia. The most celebrated among them was that of swift-runner Ladas, and the Discobolus, or hurler of the discus, a work of art highly admired by the Romans, as is proved by the many Italian copies of it made in marble, the finest of which is that now in the Lancelotti Palace, Rome. On medals, basins, and reliefs there are still extant copies of his Athenian work, 'Athene throwing Away the Flute,' etc. A marble copy of his 'Marsyas' is in the Lateran Museum at Rome, and one in bronze is to be seen in the British Museum. He was equally successful in the representation of animals. His 'Cow' in the market at Athens was the subject of many a laudatory epigram and was brought to Rome in the time of Cicero. Myron gave a somewhat exaggerated slenderness to the human form, which he modeled with exquisite beauty and anatomical accuracy, but was not a master of facial expression.

Myrrh, a popular name for a gum resin produced by *Balsamodendron myrrha,* variously referred to the natural orders *Burseraceæ* and *Amyridaceæ;* also for a garden plant *Myrrhis odorata* of the natural order *Umbelliferæ.* The resin is obtained from Arabia and adjacent Africa from a small, prickly, stunted, gray-barked tree which bears few small denticulate leaves, and smooth, brown, egg-shaped drupes as large as currants. The drops, granules, or tears which in commerce are brown, red, or yellow, are at first rather oily, yellowish, and soft, becoming brittle with age. They have a pleasing balsamic odor and lasting, bitter, aromatic taste. From earliest times they have been used for making incense and other perfumes and have been reputed useful in medicine, especially for cleansing the mouth and sweetening the breath.

Myrrh, the garden plant, is also known as sweet cicely, which has been cultivated for ages as a sweet herb for flavoring salads and culinary preparations. It is little grown in the United States except by people of rather recent European ancestry.

Myrta'ceæ, a natural order of trees and shrubs, the myrtle family, comprising about 70 genera and more than 2,000 species widely distributed in warm climates but sparingly in temperate. It is one of the most important families of economic plants. Some of the species, such as pomegranate (*Punica granatum*), guava (*Psidium spp.*), luma and ugni (*Myrtus*) yield important fruits; some such as cloves (*Eugenia sp.*), allspice (*Pimenta*), furnish highly valued spices; and still others, especially species of *Eucalyptus,* are leading timber trees of the world. The species are characterized by simple, entire leaves generally dotted with glands; perfect flowers in racemes or sometimes cymes, and various kinds of fruits. The order is variously limited, some authors including as sub-orders certain groups ranked as orders by other botanists. As extended, the order includes nearly 3,000 species. See MYRTLE.

Myrtle, a popular name for several unrelated plants of which the following are probably the best known: Grape myrtle (*Lagerstrœmia indica*) of the natural order *Lythraceæ;* running myrtle (*Vinca spp.*) of the order *Apocynaceæ;* sand myrtle (*Leiophyllum, spp.*) of the *Ericaceæ.* When unqualified the name generally refers to various species of Myrtus of the natural order *Myrtaceæ.* The common myrtle (*M. communis*) is an evergreen shrub native of the Mediterranean region and western Asia, whence it has been introduced into gardens throughout the warmer temperate climates of the world for its foliage and flowers. It was used in Greek festivals as sacred to Venus and as the symbol of beauty and youth. Its aromatic leaves and berries were formerly used in medicine and its bark in tanning, uses still made of them to some extent in southern Europe. The small leaved myrtle (*M. microphylla*), the luma (*M. luma*), and the Chilian guava (*M. ugni*) yield edible fruits, for which they are planted in South America and to some extent in California.

Myrtle Tree. See BEECH.

Mysia, mĭsh'ĭ-ạ, Asia Minor, a name anciently applied to a district which varied greatly in extent at different periods. The name first occurs in the legend of Telephus, who became king of Mysia. Under the Persian empire Mysia was the name of the section between Lydia on the south and the range of Ida on the north. It was united with the region on the north and with Lydia in forming a single satrapy. After the overthrow of the Persian empire by Alexander the Great, Mysia fell to Lysimachus (311 B.C.). Subsequently it formed part of the Græco-Syrian kingdom, then of the kingdom of Pergamus, and finally, in 133 B.C., was bequeathed with the rest of the kingdom of Pergamus, by Attalus III. to the Romans, by whom it was made a part of the province of Mysia. When the divisions of Asia Minor were settled under Augustus, the name of Mysia was given to the whole of the northwestern district, bounded on the north by the Propontis (Sea of Marmora), east by Bithynia and Phrygia, south by Lydia, and west by the Ægean Sea. Under the later empire Mysia was erected into a separate proconsular province, and received the name of Hellespontus.

Mysore, mī-sōr', or **Maisur,** mī-soor', India, (1) the capital of the native state of the same name, 250 miles west by south of Madras, in a valley 2,450 feet above sea-level, dominated on the southeast by Chamundi Hill 1,040 feet higher, with a temple on its summit. Modern enterprise on European methods has greatly improved the town. The streets are broad and regular, the houses intermingled with trees and temples, and there are several fine modern public buildings, including the British Residency. The fort built in European style, and separated from the town by a promenade, encloses the Maharaja's palace, and the dwellings of his officials.

(2) The native state ruled by a maharajah, is bounded north by Bombay and Madras, east, south, and west, by Madras and Coorg, and has an area of 27,936 square miles. Coffee plantations and gold mines are the chief sources of its wealth. The principal commercial centre is Bangalore (q.v.), the capital is Mysore, described above. After being impoverished under native administration, the British took charge from 1831 until 1881, when the state was restored to a representative of the old dynasty, trained in a British school. The state is now one of the most conspicuous examples in its government and general prosperity, of the success of this method. Pop. about 6,000,000.

Mysteries, in ancient history, were among the Greeks, and afterward also among the Romans, secret religious assemblies, in which no uninitiated person was permitted to take part. They originated at a very early period. They seem to have had a double object — first, that of handing down the traditions relating to the divinities in whose honor they were celebrated; and secondly, that of teaching and practising religious rites. The true value of the mysteries did not lie in dogmatic teaching, but in the moral improvement apparent in the votaries, in the comfort the rites gave in the present life, and the hopes they inspired for the world to come. The most important Greek mysteries were (1) the Eleusinian; (2) the Samothracian, which were celebrated in honor of the Cabiri in all the places where these divinities were worshipped. (3) The Dionysia, at Rome called Bacchanalia, which were celebrated in honor of Dionysus or Bacchus. These mysteries were of so licentious a character that they were first forbidden in Thebes, and afterward in all Greece, as prejudicial to the public peace and morals. This was likewise done in Italy by a decree of the Roman senate in 186 B.C. (See Bacchus.) (4) The Orphic, consecrated to Dionysus Zagreus, the son of Zeus and Persephone. (See Orpheus.) See also Miracle Plays.

Mysteries of Udolpho, The, a famous romance by Mrs. Anne Radcliffe, published in 1795. Like the famous 'Castle of Otranto' of Horace Walpole, this story belongs to the school of lime-light fiction. Udolpho is a mediæval castle in the Apennines, where, during the 17th century, all sorts of dark dealings with the powers of evil are supposed to be carried on. Sheridan and Fox praised the book highly; the grave critic and poet-laureate Warton sat up all night to read it; Walter Scott thought that, even setting aside its breathless interest as a story, "its magnificence of landscape, and dignity of conception, of character, secure it the palm"; while Mathias, the author of 'The Pursuits of Literature,' who knew more of Italian letters than any other man then in England, discourses on "the mighty magician of 'The Mysteries of Udolpho.'" It is marked by that "art of poetical landscape," which, according to Garnett, the author, "may almost be said to have introduced into the modern novel."

Mystery of Edwin Drood, The, an unfinished novel by Charles Dickens (q.v.), written in 1870. The story ceased at the sixth chapter and leaves a murder mystery unsolved.

Mystic Shrine, Ancient Arabic Order of Nobles of the, an order said to have been founded at Mecca. The American order is composed only of Knight Templars and 32d degree Masons. The membership amounts to 68,000. See Masonic Fraternity.

Mysticism, a term derived from the Latin *mysticus*, Greek μυστικός, mystical, secret, from μύστης, a mystic, one initiated into mysteries, and from μύειν, to close the lips or eyes. Mysticism has for many minds a repellent sense, owing, as a recent writer has acutely observed, to its association with the delusions of visionaries and the extravagance not only of gnostics and Neoplatonists, but of many so-called Christian mystics, who, misled by a resemblance in terminology and statement, as well as in practice and discipline between the false and the true, have failed to observe a difference of infinite moment in principle and substance, and have striven to mingle into one system utterly antagonistic elements. Against extravagances such as these common sense has justly rebelled, while philistinism has found in them a pretext for making a clean sweep of everything that would seem to raise religion above the plain man's apprehension and criticism.

For many, mysticism means simply an abandonment of all attempt to reconcile the "religious sentiment" with intelligent thought, a deliberate yielding of one's self to any unchecked and unverifiable fancy or speculation which seems to interpret the vague yearning of the soul after a transcendent being. Or it suggests a morbid quietism effected by a complete deadening of the affections and stupefaction of the mind, an Oriental contempt not only for everything material and natural, but even for all desire and existence; thus giving a Buddhist interpretation to the Christian discipline of self. Or at best the term stands for the exalted state of a few saint-like beings who have attained to a preternatural state of communion with the Deity, a state that has no practical interest to the ordinary mortal. But merely to tabulate the countlessly divergent senses associated with the term, not only in common usage but by authors of high repute, would exhaust the limits of the present article. The reader interested in the matter can consult some such work as that of Mr. Inge, mentioned below. One reason for the great discrepancy of usage has been already suggested. The confusion results mainly from the failure to view mysticism objectively in its ultimate meaning and relations, its origin and finality; an omission on which has followed a confusion of a primary and an essential property of human nature with one or other of its merely contingent modifications or partial tendencies; and thus abnormal and insane phenomena have come to be associated with a term which radically expresses the deepest movement and loftiest aspiration of man's being.

Like all other words of similar structure, the term mysticism connotes both a tendency or a realized experience, and a theory conversant therewith. For the sake of brevity the former acceptation may be here subsumed under the latter. The finality inherent in all creation — a tendency so immanent in nature that the effort to explain it away by reducing it to merely mechanical motion is impugned by the very ideas and terminology in which the attempt is conceived and expressed — reaches its highest expression in man's nature. Whether it be viewed as a process of natural selection, an adaptation to environment, a part of the struggle for existence, or under any other biological metaphor, this tendency to a purpose is as essentially — nay, surpassingly more so — a property of man as it is of any of the lower forms of life, vegetable or animal. If it be asked what is this purpose, this goal to which man ever presses, the answer may be given in terms of universal significance, that ultimately it is the realization of the plan of the universe. To this end, however, man strives unconsciously, and in a certain sense mechanically and involuntarily. Proximately, on the other hand, man is forever seeking self-realization, the development of his total self. This self, however, is perfected only in and by the exercise of its highest activity, and that activity can reach its complete perfection only when directed to and exercised on its highest object. Now man's highest activity to which all other forms of energy within him are subordinate is mental, intellectual and volitional, and the highest object answering thereto is the True and the Good. The True as perfective of the intellectual side of human nature is identified with the Good as it satiates the appetitive or conative side, and both are concretely realized only in the Supreme Being, the Infinite, the Absolute, God. Now the mystic is one who, whether explicitly or implicitly, recognizes this essential relation of his nature to God and strives to adjust his life accordingly. It may of course be said that this is a conception of mysticism in the abstract, as seen from some transcendent viewpoint of man's personality, but not of mysticism in the concrete, as it occurs in actual life and history. In some measure this may be admitted. On the other hand it is the conception realized in those who have lived it out in the sanest form and the most perfect degree, and is inapplicable only in the case of those who directing their energies to some one or other partial object; to an object answering to only individual tendencies of their nature, to the neglect of the demands of their complete selves, have thrown their lives into disorder and confusion and have brought mysticism into obloquy and derision.

It is almost impossible to make any classification of mysticism that shall be adequately comprehensive. For the purposes of this article it will suffice to consider it as a rationalistico-natural or purely philosophical, and as a Christian-theological or primarily religious experience and theory; though these distinctive qualifications are far from being mutually exclusive; on the contrary they overlap at more than one point. Christian mysticism is substantially *philosophical* and of course rational; but it introduces a supra (not contra) rational element. On the other hand what is here called *rationalistico-philosophical* mysticism may and does with many of its disciples include Christian doctrine and practice, and in so far may claim the latter title. For the rest the distinction will become plainer from what follows.

I. *Rationalistic Mysticism.*— As a philosophical theory this attributes to the human mind the natural ability to rise to an immediate intuition of the Absolute, that is, God, and therein and thereby to an intuition of all truth. This immediate vision whilst reflective and contemplative is not attained so long as the mind remains on the lower level of ordinary discursive reasoning. Such thought being, it is claimed, confined to the sensible, to empirical phenomena, cannot attain to higher ideal truth. To contemplate the Absolute, man must withdraw his mind from the world of sensuous phenomena, inhibit all discursive activity, and concentrate his mental energy. As the mind escapes from the mists of earth the rising light of a higher vision is felt. In that vision the lower cognitive powers become inactive, the very consciousness of self is obliterated and the mind is absorbed in ecstasy. The ecstatic state is a condition pre-required for the contemplation of the Absolute. This state, however, is attained only through ascetic practices and he alone who reaches its heights is enabled to contemplate pure ideal truth and manifest it to others as he has perceived it. In ecstasy, moreover, the mind becomes interpenetrated, even identified with God. Nay more, ecstatic vision is one and the same with the act in which the Deity contemplates His own self: "the eye with which the ecstatic sees God is the eye with which God sees Himself." Philosophical mysticism thus terminates in pantheism.

II. *History.*— The birthplace of this form of Mysticism is the Orient. Brahmanism (q.v.) is a finished mysticism. For it Brahma is the sole existent. What is is Brahma, and what is not Brahma is nothing. Things mundane are distinct neither from Brahma nor from one another. They are simply modifications of Brahma. So long as the mind conceives of them as distinct it is in a state of delusion. From this delusion it must free itself by penetrating into the vision of the unity of all things in Brahma. To this end man must perform works of penance and sacrifice, cut himself loose from the sensile and sensuous world, and by concentration of his entire physical energy absorb himself in the All; that is, lay aside all self-activity and allow the One alone to work within him. Then will the light of vision rise on his mind and in everything he shall see the Brahma, the eternal self-existent One, the All. Oriental mysticism was transplanted to the West by the Neoplatonists (q.v.) in the form of emanational pantheism. God is here the primal One and the primal Good; from Him emanates directly the νοῦς (Nous) wherein are contained the ideas of all things and from which proceeds the world-soul. The human mind is in turn an emanation from the world-soul and, remaining essentially included therein, it lives in essential connection with the *Nous* even as the latter remains in essential union with the primal One. Thus is the soul enabled to rise to an immediate vision of the primal unity. Sense cognition is simply a dream of the soul from which it should withdraw and sink itself in its centre, the *Nous;* and as the latter is essentially the universal *Nous* revealing itself in the human soul and absorbed in the contemplation of the primal One, therefore is the human soul likewise through the indwelling *Nous* able to reach this same contemplation of the original unity; and when it arrives at this state all images, thoughts and even self-consciousness disappear and the subject enters the state of ecstasy.

This mysticism more or less modified played its part in later times. Aside from the Persian Sufi, who in the Middle Ages cultivated mysticism within the pale of Islam, there appear among the Christian people of the West tenets that strongly suggest the Indian and Neoplatonic mysticism, for example, with Meister Eckart (q.v.) and the school of German Mystics emanating from him. Eckart is at present defended against the charge of pantheism; nevertheless it is undeniable that his mysticism touches very closely on the boundary line that separates the Christian from the pantheistic world-view. Eckart distinguishes two factors; the "basis" (Fünklein, spark) and the powers of the soul, analogously to his distinction in God between the basis or "ground" and the divine persons. The "ground" of the soul he places in essential union with the "ground" in God. There is something in the soul, he says, that is identified with God, that is one with and not simply united to Him. It is uncreated. This something is the "spirit" the ground or basis of the soul. Here the "ground of God is my ground and my ground is God's ground." Now this divine spark in the soul he continues, is the organ of mystical contemplation. The "powers" of the soul do not reach God immediately. If man is to see God, the vision must be mediated by a light which is God Himself. And this light shines in the "ground" of the soul. Therefore does the soul see in the "spirit" God's pure essence as it is in itself. The "spirit" or "ground" of the soul penetrates into that "ground" in God, in which the latter is pure simple unity neither Father nor Son nor Holy Ghost. There, in this its "ground," the spirit seeks God, there to know and love Him without medium or veil. There is "my eye and God's one eye, one vision, one knowing, one love. The eye whereby I see God, is the same eye wherewith God sees me. In order, however, to reach this vision of God in His "essence" (ground) man must first of all forsake all sin by genuine repentance. Next he must withdraw from all outward things, from himself and his "powers" and concentrate himself entirely within the essence of his soul; and having reached this state he must "leave" himself to God, hold himself passive and allow God alone to work within him. (Gottlassenheit.) Then will there arise in the essence of his soul (ground) a heavenly light. In this light God reveals to man the entire "ground" of the Deity; the whole essence of God becomes revealed to man. The soul likewise flows into God; its essence and life passes over into the essence and life of God; man is deified, is born a son of God; just as is the Eternal Word.

Subsequently the mystical Theosophists Valentine Weigel and Jacob Böhme built on the teaching of Luther who was in close sympathy with the "German Mystics," a form of mysticism which in many respects surpassed what most men will call the extravagance of Neoplatonism. A few expressions of Böhme will suffice in this connection. The soul he teaches has its source and origin in the essence of the Godhead; in its "ground" the light of God is enkindled. Now in and by this divine light the soul is enabled to enter into the very heart of the Deity and to see therein without any intermediate the primal generation of God in the three principles of being, and the process of becoming of all things. As I then, he says, earnestly uplifted myself to God, the spirit of God broke through me and my spirit broke through unto the inmost generation of the Deity and in this light did my spirit see all things. The influence of Böhme is seen later in the philosophy of Schelling (q.v.).

Neoplatonic mysticism modified by Protestant doctrine reappears in the 17th century in the mystical speculations and practices of the Cambridge Platonists Cudworth, Henry More and John Smith. Other noteworthy mystical writers in England during the same century were George Herbert, Francis Quarles, Henry Vaughan, and in the following century William Law.

III. *Christian Mysticism.*— A recent writer has greatly simplified this subject by defining mysticism as "the love of God," and he quotes in confirmation an author whose genius and amiable personality have endeared him hardly less to those who differ from him in religious belief than to those who venerate him as Saint Francis de Sales. Speculative theology, he says, tends to the knowledge of God. Mystical theology to the love of God,— mental prayer and mystical theology are one and the same thing. They are neither more nor less than the loving intercourse which the soul holds with God. In this sense every Christian whose practice accords with his profession is more or less of a mystic and differs from the highest mystic, the saint, not in his mysticism but in the degree of his mysticism. The term however is usually restricted to the higher degree of unitive insight. This simplification of the subject will doubtless be mistrusted, mostly by those who insist on associating all mysticism with mystery and in placing both if not against at least above reason. They should, however, remember that all even human love in a measure transcends reason. Feeling, instinct, sympathy, antipathy, telepathy, likewise, how quickly and far they elude psychological dissection! It may well be then that in the intimate communion of God with the soul which He permeates there are psychical acts and states of which reason and common sense can give no distinct account, "upraising strains that from the memory slip and fall away," as was the case in Dante's experience. But while mystical phenomena have in common with many ordinary psychical, especially emotional, experiences that they escape rigorous analysis, they lend themselves equally with their familiar analogues to a philosophy and even a certain though higher psychology. This statement will of course be a commonplace to those who are familiar with the great masters of mystical theory, such as Saints Dionysius, the so-called Areopagite, Augustine ('Confessions,' Engl. Trans.), Bernard (Engl. Trans.), John of the Cross (Engl. Trans.), Thomas à Kempis, or the more modern authors mentioned below. For the benefit, however, of those who are not thus informed a very brief summary of the principles of Christian mysticism is here subjoined.

1. As in the macrocosm, the world of living organisms, the law is universal that all life emanates from life, *omne vivum ex vivo,* and as in the scale of their various kingdoms the higher raises up and assimilates the lower, the latter receiving an essentially new and greater perfection from the former, so in the microcosm, the minor world of the human individual. Here, too, life is from life and life is from above; and the perfection of the lower consists in assimilation to the higher.

2. Beyond the natural life in man, the soul or mind, Christian Mysticism discerns a supernatural life consisting radically in a principle of activity higher than that of man's purely mental and volitional operations and consequently energizing in higher forms of thought, belief, hope, aspiration, love, etc.

3. The existence and supernatural character of this life and its activities are accepted in the first instance on faith, the data of this belief being found in the Bible, especially the New Testament. The foundations of this faith it is claimed are rational and the workings of the higher life are confirmed by experience and attested by manifest effects.

4. Essentially and objectively this higher life consists in the vivifying operation of the Divine Spirit within the human soul; accidentally and subjectively it consists in the responsive co-operation of man's mental activities with the Divine influences.

5. The reception of this higher life is normally conditioned by certain spiritual dispositions and lines of conduct — notably of faith, love, prayer, repentance and self-discipline. The soul is thus prepared by alienation from carnal and inordinate propensities and rendered more sensitive to higher stimuli.

6. According to the degree of the soul's co-operation with the indwelling Spirit of God the former becomes proportionately assimilated to the latter. The soul thus passes from what is known as the purgative to the illuminative stage of mystical life.

7. This assimilation culminates in the act of contemplation which is distinguished from meditation in that it is not elicited with mental strain and does not apprehend its object, the divine presence or cognate truths, by inference; but in consequence of the immanent light simply gazes intuitively thereon; *contemplatio pertinet ad simplicem intuitum veritatis,* as all the mystics teach. The clarity of this act or state of vision begets sentiments of admiration, *contemplatio est perspicuæ veritatis jucunda admiratio,* as St. Augustine says, and fills the consciousness with joy and rapture. The faculties are herein not merely *passive,* for contemplation is a *vital activity,* though the divine influence is the primary source of its elevation and application to the corresponding truths. The Church censured the teaching of the Spanish mystical writer Molinos on the question of the soul's passivity in contemplation,— a theory which was taken up by Madame Guion (q.v.) in France, and eliciting Fenelon's (q.v.) sympathy, entailed the well-known controversy with his great contemporary Bossuet (q.v.).

8. The unitive or contemplative state in so far as it is susceptible of psychological analysis is essentially intellectual, the mind being absorbed in intuition; it is however no less essentially volitional and in the sanest sense emotional, the whole adhesive power of the soul being drawn out in love of the object contemplated. Obviously, however, the two forms of energy intellectual and emotional act and react upon one another and in the intenser states of mental absorption entirely interfuse, all psychical differentiation being obliterated and the entire field of consciousness bathed so to say in light and love of the object contemplated. With the intellectual activity is generally though not always associated representations of the imagination wherein the object contemplated is symbolized. The object-matter of contemplation is primarily God or some of his attributes. Secondarily it may be any divine manifestation in the created, inanimate or animate order, above all in this respect the humanity of Christ. With many of the mystics the suggestion of the Divine perfections reflected from almost any object in nature was enough to lift them at once to a condition of wrapt contemplation.

9. The strictly contemplative condition varies in duration from moments to several hours, dependently on preternatural and natural conditions. In the highest stage it may become practically habitual and yet leave a normal residue of attentional energy amply sufficient for all the demands of every day life. Oftentimes it is associated with extraordinary psychical phenomena such as ecstasy, supernal revelations, visual or auditory — states wherein the mind sometimes though not always loses consciousness of self and of all else save the object contemplated. These are not, however, as many suppose, essential properties of mystical experience, but are rather effects resulting from the absorption of the psychical energy. An asserted similarity of these states to the well-known phenomena transpiring under the various forms of somnambulism, obsession, divided personality and the like, has led many psychologists to confound all mystic states with abnormal psychoses. The subject here opened out is a large one. The reader will find it fairly discussed in 'The Psychology of the Saints.' Suffice it to note with M. Joly that the true mystical state as realized in the Saints' experience is not a "disintegration" of the powers of the mind; it is an aggregation of the closest possible kind, which derives its strength from a higher principle under the control of which it forms and sustains itself. It is not a "narrowing of the field of consciousness" but rather the opening out of a wider field, at the cost, if we may use the expression, of a narrowing of the field of passing sensations and empty illusions. Neither is it a "division of the personality" although it certainly evokes what may be called a "new personality," and that at the cost of great sacrifice and much suffering. This "new personality" is not a medley of divided and disordered parts. It exhibits a cohesion, a strength and a unity above anything else which psychology can show us. This "new personality" also retains whatever was best of the original personality and these surviving elements combine peacefully with the new.

10. None the less the Saints, the typical mystics, were fully alive to the fictitious semblance of purely natural, both normal and abnormal, subjective states to genuine mystical experience and writers on the subject have laid

down certain signs for discerning the true from the false. Usually they point to the «fruits of the Spirit» as enumerated by Saint Paul (Gal. 5, 22); «charity, joy, peace, patience, benignity, goodness, longanimity, mildness, faith, modesty, continency, chastity." The essence of all these fruits of true mysticism is self-denial, love of self-sacrifice and humility; only where such dispositions are habits can the subject be said «to walk by the Spirit.» This mental attitude the mystics observe shows itself in subjection of the will to God and to lawful authority, a care to avoid self-obtrusiveness, a tenderness of conscience, zeal for self-control, deep interior peace even in the midst of misunderstandings and persecutions. On the contrary, they say, where the opposite signs prevail, self-conceit, obstinacy, an appetite for singularity, moroseness, refusal of humiliation, sentimentality in devotional observances, unrest and such like,—all being indications of pride, vanity or some form of sensuality — there the subject, though seemingly wrapt up to the third heaven, will be found to be the victim of an active or a passive delusion.

II. From the foregoing principles it should be inferred that *Christian* differs essentially from purely rational mysticism in the primacy it gives to *divine* influence in mystical experience. The uplifting and sustaining of the intellect and will in communion with God are due not in the first instance to purely innate endowments but to a transcendent light and energy. Christian mysticism as a theory ignores or pretermits none of the ascertained facts and legitimate inferences of psychology and philosophy, but it claims to supplement this knowledge with principles and deductions of a religious and theological character. The higher influences thus postulated though distinct from are nevertheless continuous with the normal psychical life of the mind, just as the higher mental powers are themselves distinct yet not severed from the sentient and organic activities. Thus genuine mysticism by its sharp distinction between the mental activities and the immanent Deity steers clear of pantheism. The terms «deification,» identification with God and the like in which mystical writers speak of the contemplative state are meant to express the close *union* of the soul with God but not a *unity* or substantial identity.

IV. *History of Christian Mysticism.*— Mysticism as an experience is as old as humanity. The patriarchs Abraham, Isaac, Jacob, Moses, are described in the Bible as men who while not exempt from human failings, lived more or less habitually in converse with God, while the prophets from Samuel to the Baptist passed much of their lives in the abiding realization of the divine presence. The unitive or highest form of mystical life culminates in Christ, who though of necessity perpetually conscious of His Divine Personality nevertheless frequently retired from human association to commune with His Father in the solitude of the mountain or desert. Christ became for all future time the pattern of the mystical life while His Personality, deeds and words have formed ever since the chief subject-matter whereon the genuine mystical mind has been nourished. As His example and teachings spread abroad and the realization of their power deepened in the Christian consciousness the tendency to devote more and more of life to mystical contemplation increased. Spontaneously and gradually at first and accelerated afterwards by the pagan persecutions which drove numbers of the early Christians into the deserts the eremitical and subsequently the monastic state grew up and developed, at first in the East and in Egypt and later on throughout Western Europe. Monasticism (q.v.) was and is essentially an institution established as a means to facilitate and conserve the contemplative life. Some of the religious orders were founded almost exclusively for this end. Others, and these the majority, aimed at combining the contemplative with the active life, a so-called mixed status wherein the cultivation of an abiding consciousness of the Divine Presence should fructify and energize in labor for human welfare. How successfully this aim was accomplished is told in the history of monasticism and the biographies of such men as the Gregories, Basil, Benedict, Bernard, the Francises, Dominic, Borromeo, Loyola; and of such women as Hildegarde, the Elizabeths, the Catharines, Teresa and other well-known heroes and heroines, of human as well as of divine charity; all of whom drew inspiration and energy for lives of continued self-sacrifice from an almost uninterrupted communion with the Unseen.

Though monastic retirement and discipline facilitate and foster the genesis of mystical habits, they are by no means essential thereto, as is patent from the case of numberless men and women who in every age have successfully united a high degree of contemplation with every variety of secular occupation. Here again the lives of the true mystics, the Saints, show that the cultivation of an abiding converse with God culminating frequently even in deep mystical union is compatible with all the duties and reasonable demands of social life.

V. *Mystical Theology.*— It is with mysticism as with every other human experience, theory follows on life. Speech precedes grammar, thought logic, conduct Ethics. *Primum est vivere deinde philosophari.* As mystical tendencies and habits spread and strengthened, there gradually grew up a mass of facts and inferences which constituted in time the body of a mystical theory, or what is known as mystical theology, and which took its place in the evolution of Christian doctrine as a sequent of moral theology. Mystical experiences were analyzed and systematized, principles induced therefrom and clarified in the light of Biblical and Patristic teaching, and practical rules for discernment and guidance in the mystical life were formulated; the whole developing by degrees into an organized science or discipline. The writers eminent in the formative stage of mystical theory were Sts. Basil, Gregory of Nyssa, Gregory of Nazianza, Chrysostom, John Climacus, Cassian, Gregory the Great, Ambrose and Augustine. The first systematic work on the subject was that of Dionysius, the so-called Areopagite. In the intense intellectual ferment that followed the triumph of Christianity the Neoplatonists endeavored to set up against Christianity a world-religion whose controlling tenet it was that the universe is simply a phenomenon of the divine life, the human individual a manifestation of the divine essence, God coming to consciousness in man. Dionysius opposed this teaching, vindicating the Christian doctrine that in the union of the human soul with the Deity it retains its distinct entity. During the Middle Ages the works of Dionysius became for the mystical writers what the 'Sentences' of Peter the Lombard was to the Scholastics, a text for the numerous commentaries of eminent writers such as Hugh and Richard of St. Victor, William of Paris, Bonaventure, Dionysius the Carthusian, Gerson and others. The Scholastics, likewise, especially Aquinas, based their treatment of mystical phenomena on the Areopagite. The influence of Neoplatonism (q.v.) lingered however in the writings of Erigena, even though he translated the works of Dionysius.

A tinge of Neoplatonism moreover clings to the fourteenth and fifteenth century writers, Tauler, Suso, and Ruysbroek, who theorized more in the interests of an intellectual union with God, while the most eminent teacher of practical mysticism — union of will — was at this time Thomas of Kempen. In the subsequent centuries practical mysticism is systematically represented by Sts. Teresa, John of the Cross, Francis de Sales and Ignatius of Loyola. The works of these writers have for the most part been translated into English. Among the later mystical authorities may be mentioned Louis of Blois, John of Avila, Louis of Granada, Louis da Ponte, James Alvarez, Alphonsus Rodriguez, Nieremberg, Lancicius, Surin, Godinez, Scaramelli, Benedict XIV., and Schram.

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Mystics, a religious party which arose toward the close of the 3d century. They held to the possibility of direct intercourse with God, and that they possessed knowledge of God unattainable by the natural intellect.

Mystropetalon, a genus of leafless root-parasites constituting the tribe *Mystropetaleæ* of the order *Belanophoreæ.* It contains two South African species. It is known by the two or three free stamens, cubical pollen-grains, and the two-lipped staminate and bell-shaped pistillate flowers. The stem is sheathing covered by imbricated scales; the flowers in dense heads or spikes. They are monœcious, the male flower being on the upper and the female on the lower part of the spike. The fruit is a rounded achene.

Mytens, mī'tĕnz, Daniel, Dutch painter: b. The Hague about 1590; d. Holland 1642. He went to London, England, and was welcomed at the court of James I.; he was appointed painter royal by Charles I. and was much favored by the king and aristocracy. Many of his portraits, which are bold and spirited in conception, broad in treatment, and of admirable color, are in Hampton Court. When Van Dyck came to England he gradually eclipsed in royal favor the glory of his predecessor, who returned to Holland.

Myth, a general name for certain kinds of folk-lore stories, historic tales setting forth the processes of nature, or beliefs about religion, custom, tradition, etc., and differing from fable (q.v.) and from legend (q.v.). There are many subdivisions to comparative mythology, such as the Hindu myths regarding caste, the Polynesian water-myths, the Greek myths concerning Diana, and the Valhalla myths of the Teutons. We have the fable of Zeus and the frogs pointing out a moral lesson, and the legend of Saint Christopher, which only tells of a miraculous event, but the myth of Zeus or Jupiter is based on the belief in a god of the skies and is a part of nature worship.

Mythen, mē'ten, The, two mountain peaks of the Jura chain of the Alps. They are situated in the canton of Schwyz, Switzerland, about 20 miles east of Lucerne. They are among the loftiest peaks in this section of the country, and, according to some authorities, one of the most charming views to be had may be obtained from their tops. The height of the Great Mythen is 6,245 feet.

Mythical Islands, imaginary islands described in popular fable, romance, and song, supposed to have existed in all ages in the several oceans of the world. The Islands of the Blessed were creations of the Greeks, who there placed the homes of all who had been first mentioned by Plato, and situated in the realm of eternal bliss. The lost Atlantis was first mentioned by Plato, and situated in the same part of the world. The fairy isle of Avalon is a feature of Celtic mythology presenting an exact counterpart to the Greek Island of the Blessed. The mythical land of Saint Brendan is also of Celtic origin and was thought to lie off the west coast of Africa, where, even as late as the 18th century, frequent expeditions searched for it. The Island of Seven Cities was also long sought for, and its settlement is ascribed in legends to the Christian refugees from the Iberian Peninsula, who had been driven out by the Mohammedans. Probably the best known mythical lands or islands during the Age of Discovery were the island of Bimini, in the Bahamas, and the island of Brazil.

Mytho, Mitho, or Mito, French Indo-China, a town of Cochin-China, on the northernmost branch of the Me-Kong delta, 58 miles by rail southwest of Saigon. Mytho is an important trading centre for the produce of Cambodia and Annam, and the railway from Saigon was the first built in the country. Pop. 30,000.

Mythol'ogy, from the Greek *muthos,* or *mythus,* a tale or fable, and *logos,* a discourse. This is a collective name for the entire body of fables, legends, myths, and traditions, that arise in the earliest periods of a nation's existence and of its civilization, and which embody the convictions of the people among whom such fables arise as to their gods or other divine personages, their origin and early history, and the heroes connected with it. Such fabulous narratives seem to grow up naturally among all early peoples, and are found among the ruder races at the present day, but the mythologies which have been most studied, and the tales belonging to which are best known, are those of ancient Greece and Rome, Scandinavia, the Hindus, and ancient Egypt. Though speculations as to the origin of mythology have been put forth from a very early period, it is only in recent times, by the help of comparative philology, and by comparing together the myths of different peoples (comparative mythology), that any real advance has been made, and the study of mythology placed upon a scientific basis. The mythologies of Greece and India have been most fruitful for this purpose, and that of Greece in particular must always be largely drawn upon in any exposition of the results arrived at by modern investigators. Myths are of course believed in by the bulk of the people among whom they are current, and it is only when speculative and reflective spirits arise, and when science and philosophy have made some advances, that their truth is called in question.

Classification.— It is difficult to find a general theory which will explain the origin of all myths, for though we may admit that many, perhaps most, of them are physical in origin, it is impossible to deny that others may be pure fabrications, tales invented by early bards or minstrels to beguile a weary hour, while in others fragments of real history may be hidden. To decide what class any myth is to be referred to, we must trace it, if possible, back to its earliest and most rudimentary form, and then, by the aid of the science of language, we may be able to say whether it is physical in origin or not; but as this will in many cases be impossible, there must remain a number of myths whose origin cannot be settled.

Greek.— Among the Greeks there was a method or system of interpretating myths and mythological deities, by which they are regarded as deifications of dead heroes and poetical exaggerations of real histories. This was the belief or philosophy of Euhemerus, a Greek philosopher, whose method or system has been called Euhemerism. By disciples of this school, Jupiter is said to have been an ancient ruler of Crete; Æolus (the god of the winds), a skilful mariner; Atlas, a great astronomer, and so on. The Euhemeristic school is not even yet extinct, and at the present day it includes some who find in the sacred Scriptures prototypes of mythological personages. Zeus, Apollo, Athene, Heracles, and the other divinities of ancient Greece, were believed by the bulk of the people to have a real existence, and the stories regarding them were looked on as true; but even in Greece in early times the absurdities and monstrosities of some of the myths led to attempts at explaining the stories in such a way as that they should not shock common sense or moral feeling. By some authors the stories that represent the gods as guilty of gross immorality, as impure, cruel, and deceitful, were flatly denied, and those authors in whose writings such stories are found were accused of having invented them themselves. Homer and Hesiod were severely censured by Xenophanes and Heraclitus on this account; and Plato would not endure the idea that the Homeric poems should be admitted into his ideal republic.

Hindu.— Prominent among the Hindu myths we find the sky god Dyaus (from *dyu*, to shine), whose name, however, always retained its meaning of sky, so that Dyaus had only an indistinct personality as a deity. Dyaus is the same as Zeus, and also the same as the *Ju* of the Roman Jupiter, the latter part of this name signifying simply father. The Hindu Varuna, a sky god, is conceivably the same as the Greek Ouranos, which word, besides being the name of a deity, had the ordinary signification of sky or heaven. The Vedic god Indra again, whose name is derived from *indu*, Sanskrit drop or sap, and therefore would mean the giver of rain, corresponds closely to Zeus in his attributes; like him, and like the Norse god Thor, he is the wielder of the thunderbolt. So the bright Vedic goddess Ushas, the dawn, is the Greek Eos, the dawn; while Ahana, another name for the dawn, is the Greek Athene.

Scandinavian.— The mythology of the North European people include folk-lore tales and the like of Denmark, Norway, Sweden and Iceland. Among the gods of the north are Thor, god of thunder, the strongest of gods and mortals, whose hammer, Miölnir, crushes the hardest objects, and Baldur, the youthful and beautiful god of eloquence. Niord is the god of winds, of sailors, of commerce, and of riches; his son Frei is the ruler of the sun, and on him depend rain and sunshine, plenty or dearth. Freya is the goddess of love. The mildest and most bountiful of the gods, she is a friend of sweet song, and loves to hear the prayers of mortals. Tyr, a son of Odin, the fearless god, who wounds by a look, is lofty as a fir, and brandishes the lightnings of battle. He is not properly the god of war, but rather of power and valor. His brother Braga is the god of wisdom and poetry. Braga's wife is Iduna, who preserves the apples of immortality, which she offers in vessels of gold to the heroes at their entrance into Valhalla. The Valkyrias or “choosers of the slain” are awful and beautiful beings, neither daughters of heaven nor of hell. Mounted on swift horses, they conducted the heroes to Valhalla. Another striking figure is Loki, as beautiful as he is malignant. By the giantess Angerbode he had Hela, the goddess of the lower regions, the wolf Fenrir, and the terrible serpent of Midgard, Jormungandur, which surrounds the whole earth. Hela rules in Niflheim. All who die of sickness and old age, and not in war, descend to her dark mansion. Other mythical personages were the Norns or fates, and Heimdall, who keeps watch on the bridge Bifröst. The popular belief was all would perish in a final crash of doom.

Indians and Savages.— Andrew Lang, the English student of mythology, declares that he finds a key to mythology in the study of the myths and mental habits of savage races. He maintains that “the savage and senseless element in mythology is for the most part a legacy from ancestors of the civilized races who were in an intellectual state not higher than that of Australians, Bushmen, American Indians, the lower races of South America, and other worse than barbaric peoples,” and that the monstrous myths current in Greece, Egypt, and India were thus inherited. He points to the currency of such myths among savages at the present day, and to the fact that in general savages are eager to arrive at some explanation of the natural phenomena around them, and are quite satisfied with explanations that to civilized men may seem even imbecile. When a phenomenon presents itself the savage requires an explanation, and that explanation he makes for himself or receives from tradition in the shape of a myth.

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Mytile'ne. See MITYLENE.

Myxœde'ma, a cretinoid state appearing in adult life, presenting many nutritive changes, and especially a solid œdema in the subcutaneous tissues. Its cause is a loss of function of the thyroid gland (q.v.), and a resulting diminution in the supply of its secretion to the blood. It is strictly a fibrosis of the thyroid. The disease was first described by Sir William Gull of London in 1893. A similar condition results from removal of the gland by operation. Women are the principal sufferers, furnishing 80 per cent of the cases. Myxœdema is found in cold climates, and probably most frequently in Europe; in certain districts it appears to be endemic. The onset of the disease is gradual, and the symptoms are loss of activity, sensitiveness to cold, falling of the hair, decay of teeth and nails, rough, dry skin, spongy gums, diminution of perspiration, yellow tint and swelling of the face, paleness of the mucous membrane, subnormal temperature, constipation, albuminuria, impairment of sight and hearing, headache, slow intellection, hallucinations and, in some cases, insanity. But the most noticeable symptom is the solid œdema, which develops principally in the loose subcutaneous tissues, appearing like a considerable swelling. The face, the back of the hands, and the upper limbs first present enlargement; but in time it involves the whole body. The thickening and enlargement of the face renders the patient unrecognizable.

Treatment consists in the administration of thyroid gland and of tonics. Grafting of a partial or entire thyroid gland taken from an animal into the subcutaneous tissue has been very successful. Internally a glycerine extract of sheep's thyroid is given, or a dry extract, or an emulsion may be made and used hypodermically. This treatment was first suggested by Murray, of Newcastle-upon-Tyne, in 1891. The remedy must be used cautiously, especially if cardiac or vascular disease exists. Thyroid may cause vomiting, diarrhœa, fever, profuse perspiration, headache, glandular swellings, and prostration. The dose should be graduated so as to avoid these symptoms of poisoning. After many months of treatment the disease disappears. The dose should then be diminished, but the patient must continue to take thyroid all her life, lest the myxœdema return. (See CRETINISM; THYROID GLAND.) Consult Gull, 'On a Cretinoid State Supervening in Adult Life in Women,' in Clinical Society's 'Transactions' (London, 1874); Gimlette, 'Myxœdema and the Thyroid Gland' (London, 1895); Murray, 'Diseases of the Thyroid Gland,' in 'Twentieth Century Practice,' Vol. IV. (New York, 1895).

N

N the fourteenth letter of the English and several other alphabets, is classed as a dental-nasal consonant: it is pronounced when a voiced sound is emitted through the nose while the tip of the tongue is in contact either with the front upper teeth or with the front of the palate: the position of the tongue, whether touching the teeth or the palate, distinguishes the n of one language from that of another: the n of English speech is produced by placing the point of the tongue against the palate just behind the gums. When n is followed by a guttural either the n and the guttural form one nasal sound, as in ring, or the n becomes distinctly nasal and the guttural retains its own sound-value, as in rink; but when the n and the guttural belong to different syllables, as in the words engage, include, concave, unkind, the n usually retains its pure sound; yet the rule has many exceptions recognized by orthoepists, who while they regard the n of syncarpy, syncretist, as pure, mark the n of syncope and many other words as nasal, equal to ng. In words ending with n preceded immediately by l or m, the n is silent: kiln, hymn; in the beginning of a word a consonant preceding n is silent: know, gneiss, mnemonic, pneumatic. In many words is seen an intrusive n, as in passenger, messenger, though the words from which these are formed, passage, message, have no n. The initial n of newt, nickname, and a few other words is the n of the indefinite article which became inseparably attached to ewt, ekename, etc.; conversely, by dropping the initial n the forms nadder, nauger, napron became adder, auger, apron.

N. D'Anvers, dăn'vėrz. See BELL NANCY R.E.M.

N-Rays, a supposed form of new radiation discovered by M. Blondlot. The rays were said to be invisible, but could be deflected, and by means of appropriate screens could be seen, and were marked out in great detail by Blondlot and his followers. Many interesting discoveries were supposed to be made concerning the N-Rays; they were seen to issue from various objects, and an eminent French physiologist asserted that he had seen these rays issuing from muscles, when active. One curious thing about the supposed rays was that, while some of the observers could see them clearly, others were quite unable to see them, nor could their instruments detect their operation. Blondlot and his disciples asserted that this was due to the fact that those who were unable to see the rays possessed defective vision, and that, while the rays really existed, only those peculiarly endowed could perceive them. These rays were believed in for several months by an increasing number of scientists, though doubt as to their existence had begun to be aroused, when experimenter after experimenter failed to detect them. Finally, Professor R. W. Wood of Johns' Hopkins University, conclusively proved that these rays were subjective in character, and had no real existence.

Naar, David, American journalist and politician: b. St. Thomas, W. I., 6 Nov. 1800; d. Trenton, N. J., 1880. He entered into mercantile business with his father and brothers in New York, later removed to Elizabeth, N. J., in 1844 was elected a member of the New Jersey Constitutional Convention, and was appointed in the same year by President Polk United States consul to St. Thomas. He returned in 1848 and was elected mayor of Elizabeth. In 1853 he removed to Trenton, N. J., where he took charge of the 'True American,' a journal which he soon raised to a position of influence. In 1864 he was elected State treasurer and retired from his paper in 1866.

Na'bal, in Biblical history, the name of an Israelite of the tribe of Judah. David, having afforded protection to Nabal and saved his flocks and herds, his property, and even his life when in danger, some time after sent to him to supply his troops with provisions. This Nabal refused; on which David, stung with the ingratitude of the man, vowed to take summary justice on the ungrateful Jew and exterminate his family; and taking with him 400 men, set out for the residence of the mercenary Hebrew. Abigail, Nabal's wife, hearing of her husband's conduct and David's resolve, collected such provisions as the army required, and, attended by a train of servants, set out to meet the approaching king. Her beautiful person, combined with the excuses she made for her husband's conduct, so softened the heart of David, that he accepted her gifts, averted his wrath, and Nabal having been "smitten by the Lord" a few days after, David married his widow.

Nabatæ'ans, năb-ạ-tē'ạnz, a Semitic race of people who from the 4th century B.C. to about 100 A.D. held a position of importance in Arabia and adjacent regions. They were ruled by kings; their capital was Petra (q.v.), and they carried on a great caravan trade. Their language was Aramaic.

Nabayugan, nä-bä-yoo'gän, a tribe of the Philippines living in the province of Cagayàn, Luzon, west of Malanec. They are a warlike, head-hunting people, of Malay origin, and apparently related to the Guinaanes.

Na'bob, The, a novel by Alphonse Daudet, published in 1877. This is one of the most highly finished of the author's works. It is a romance of manners and observation; and it blends successfully many of the qualities of both the naturalist and the romantic schools.

Nabonassar, năb ō năs'ạr, **Era of.** See BABYLONIA; NEBUCHADNEZZAR.

Nabonidus, nab-ō-nī'dŭs, or **Nabonadius** (Babyl. *Nebûna'id*), last king of Babylon (555-38 B.C.). He was elevated to the throne by his fellow conspirators in the murder of Prince Labossoracus (or Laborosoachard). Soon after his accession he concluded with Lydia and Egypt an offensive and defensive alliance against the Persians under Cyrus. He then greatly strengthened the defenses of his capital. It was not, however, until 539 B.C. that Cyrus, who had already defeated the impetuous Crœsus, marched upon Babylon. Nabonidus followed the traditional Oriental strategy in opposing his foe. He fought a battle within sight of Babylon, was utterly defeated, and then, while most of his army found safety within the great walls, he himself with a small force entered Borsippa, an important town southwest of Babylon; possibly hoping by this movement to force Cyrus to divide the Persian host. His stepson, Belshazzar (Bil-shar-uzur), familiar through the scriptural narrative in Daniel, and apparently co-sovereign, conducted the defense of Babylon. After the fall of the capital, Nabonidus surrendered, was kindly treated by Cyrus, and even made governor of the province of Carmania. Some of his inscriptions show that he was a personage of historical interest. See BELSHAZZAR; CYRUS.

Nabopolassar, nă-bō-pō-läs'sạr, Babylonian king, founder of the New Babylonian empire. He was a Chaldæan, not of the kingly line, and erected an independent kingdom in Chaldæa in the second quarter of the 7th century B.C., thence extending his power to Babylon about 626. With his ally, Cyaxares of Media, he conquered Nineveh about 606, and died soon afterward, leaving the empire to Nebuchadnezzar, his son. Nabopolassar improved the irrigation of the country round Babylon and did much to beautify the city. Consult Rogers, 'History of Babylonia and Assyria' (1900).

Na'both, an Israelite, owner of a plot of ground in Jezreel, during the reign of Ahab, king of Israel, about 897 B.C. This plot lay on the eastern slope of the hill of Gilboa, and in addition to this he owned a vineyard. The palace of Ahab immediately adjoined this vineyard, which became an object of the king's desire and he offered to purchase it or give another in exchange for it. When Naboth refused to part with the "inheritance of his fathers," Ahab was bitterly disappointed, but his wife sent a warrant in Ahab's name, sealed it with his signet and caused Naboth to be apprehended, brought to Samaria, tried for blasphemy and treason on the testimony of two suborned witnesses, and stoned to death with his sons. Their mangled remains were devoured by the dogs and swine and the blood from their wounds ran down into the large tank or reservoir which still is seen on the slope of Samaria. This crime brought down the curse of Elijah upon the guilty couple (2 Kings ix. 2-26), which was fulfilled soon after in the fate of both. See AHAB, JEZEBEL.

Na'bu. See NEBO, MOUNT.

Nabua, nä'bwä, Philippines, a pueblo of the province of Ambos Camarines, island of Luzon, situated in the southern part of the province, on the Buhi River, 20 miles southeast of Nueva Cáceres. It is in a marshy region where rice is grown, and is connected with the neighboring towns by a good road. It is a military and telegraph station. Pop. 17,800.

Nabuco de Araujo, nä-boo'sō dä â-row'hoo, **José Tito,** Brazilian dramatist: b. Rio Janeiro, Brazil, 4 Jan. 1836. He served as provincial deputy in the magistracy and was for many years district attorney of Rio Janeiro, but resigned in 1879 and retired to private life. His work as a dramatist is well known in South American cities, where it has been successfully presented. He has published: 'O Filho do Acaso'; 'Biographia de Lamartine' (1877); 'Historia e Vida do General Gurjão' (1878); 'Poesias' (1879); etc.

Nabulus, nä-boo-loos', or **Nablus,** näb-loos', Palestine, the ancient Schechem, and one of the chief cities of Samaria, 30 miles north of Jerusalem, on the highest part of the fertile and fruitful pass between Mounts Ebal and Gerizim, leading from the Mediterranean to the Jordan. It is a busy trading and industrial centre, the seat of a governor, the see of a Greek bishop, and is visited by great numbers of pilgrims attracted by the tombs of Joshua and Joseph, Jacob's Well, and the Tree of the Sanctuary, three miles south on the road to Jerusalem. As a Canaanite city it was destroyed by Abimelech, a son of Gideon the judge. Rehoboam was crowned king of Israel here, and during the Greek occupation Justin Martyr was born here. It figured conspicuously during the crusades. It was the religious centre of the Samaritans (q.v.), whose descendants inhabit the southwest quarter of the town. Pop. est. 20,000.

Nachi (nä'chē) **Indians.** See CREEKS.

Nachtigal, näH'tē-gäl, **Gustav,** German explorer in Africa: b. Stendal 23 Feb. 1834; d. at sea near Cape Palmas 19 April 1885. He studied medicine; became a military surgeon; in 1861 went to Algiers; in 1863 became surgeon to the army of the Bey of Tunis; and in 1868 was sent with presents from the king of Prussia to Sultan Omar of Bornu in recognition of kindness shown to German explorers. His journey through Tibbu and Tibesti was over country hitherto untraversed by a European. He arrived at Kuka in 1870, thence explored Borku, Kanem, and the country south of Bornu, and on his way back to Cairo passed through Wadai. The years from 1875 to 1882 he spent in Germany arousing national interest in German colonization. He entered the consular service in 1882, becoming consul to Tunis, and in 1884 was German commissioner for the annexation of Togoland, Kamerun, and Lüderitzland. He died on his way back to Europe. Nachtigal's work marked a distinct era in the exploration of northern Africa, and even more notably in German colonial policy. He wrote 'Sahara und Sudan' (1879-89). His letters are collected in Berlin, 'Erinnerungen an Gustav Nachtigal' (1887). Consult also the life by Ruhle (1892).

Nacogdoches, năk-ō-dō'chĕz, Texas, city, county-seat of Nacogdoches County; on the Texas & N. O., the Houston, and the East & W. T. R.R.'s; about 120 miles north by west of Beaumont and 130 miles north by east of Houston. It is in a rich agricultural region, in which the chief products are cotton and tobacco. A government experiment station for testing the tobacco is located here. The industrial interests of the city, outside the government station, are connected chiefly with the preparation of cotton and tobacco for market.

Nacogdoches was first settled by Spaniards in the early part of the 18th century; it was first a mission, the headquarters for the converted Indians of the surrounding region. Pop. (1890) 1,138; (1900) 1,827; (1910) 3,369.

Nacré. See MOTHER OF PEARL.

Nacrite, a class of white unctuous minerals possessing a pearly shining lustre. They are usually found with mica slate, and also occur native in granite, crystallizing in four-sided prisms. The constituents are usually alumina 28.844, silica 64.440, with varying portions of lime and the protoxides of iron and manganese. Nacrite is found in various localities, notably near Brunswick, Maine, and in some parts of Ireland.

Nadal', Ehrman Syme, American author: b. Lewisburg, W. Va., 13 Feb. 1843. He was graduated from Yale in 1864 and was a secretary of the United States legation at London, 1870–1 and 1877–84. He has published 'Impressions of London Social Life' (1875); 'Essays at Home and Elsewhere' (1882); 'Zweibach, or Notes of a Professional Exile' (1895).

Nadchés Indians. See CREEKS.

Na'den, Constance Caroline Woodhill, English poet: b. Edgbaston, Birmingham, 24 Jan. 1858; d. London 22 Oct. 1889. She studied at the Mason College, Birmingham, in 1881–7; became interested in sociological problems, and lectured with effect. She was an investigator of Spencer's system of philosophy, and became the advocate of a doctrine, taught also by Dr. R. Lewins, called 'Hylo-Idealism,' an attempt to furnish a metaphysical system reconciled with the science of modern times. She is chiefly remembered for her volumes of 'Songs and Sonnets of Springtime' (1881), and 'A Modern Apostle and Other Poems' (1887). The poems were commended for their promise by Gladstone in a review in the 'Speaker.'

Nadia, nä'dē ä, or **Nud'dea,** India, a town and district of Bengal: (1) the town, capital of the district, on the Bhagirathi River, 63 miles north of Calcutta, is a place of sanctity, the seat of native Sanskrit schools, and was the residence of the last independent Hindu king of Bengal in 1203. Pop. (1901) 14,105; (2) the district has an area of 2,982 square miles. The Ganges here known as the Padna skirts its northeastern boundary and from it branch the three «Nadia rivers,» the Bhagirathi, Jalangi, and Matabhanga, which irrigate the district and are valuable thoroughfares for communication and trade.

Na'dir, in astronomy, that point of the heavens which is diametrically opposite to the zenith, or point directly over our heads. The zenith and nadir are the two poles of the horizon; the zenith, nadir and centre of the earth are in one straight line.

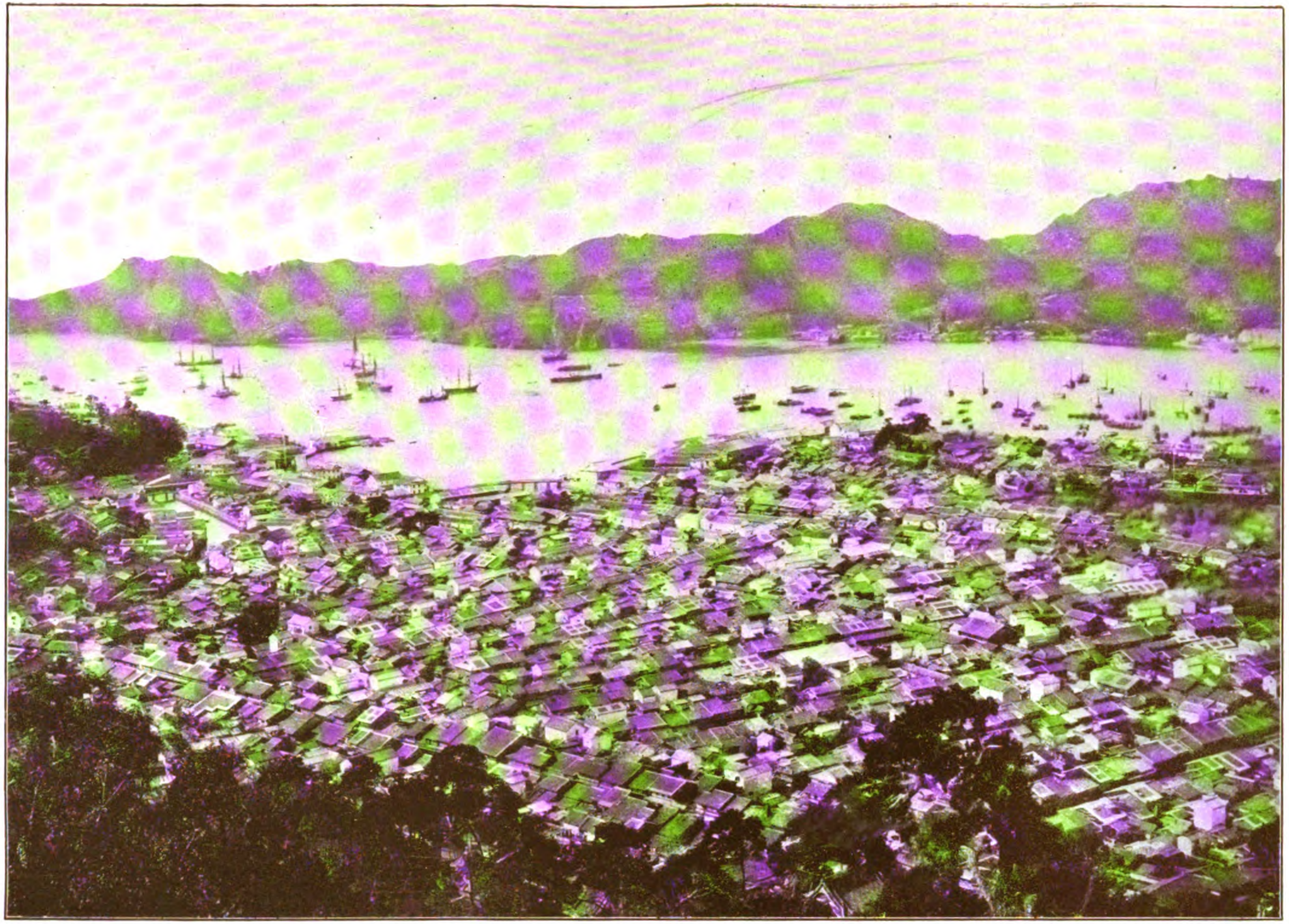
Nadir Shah, nä'der shä, or **Tamasp Kuli Khan,** king of Persia: b. Khorasan 1688; d. Fethabad 19 June 1747. He was of Turkish blood and poor family; early showed his cunning by his attempts, while in the service of different governors of Khorasan to get this province for himself, but was unsuccessful. Putting himself at the head of a band of robbers he got possession of several strongholds in Khorasan; and in 1726 entered the service of Tamasp II., for whom he checked the Afghans and defeated the Turks, and from whom he received four provinces. When Tamasp was defeated at Hamadan by the Pasha of Bagdad and was forced to cede the provinces on the Arauxis to the Turks and to make a disgraceful peace, Nadir dethroned him, put his son Abbas III. in his place and took the regency upon himself. The lost provinces were won back from the Turks and in 1736 upon the death of Abbas Nadir came to the throne, invaded Afghanistan and conquered it, took most of India from the grand mogul Mohammed XIV., pillaged Delhi, and was everywhere so successful that his empire reached from the Indus and Oxus to the Euphrates and Caspian. He made peace with the Turks in 1746, but was assassinated by the officers of his guard, who were weary of his brutal cruelty. Consult Maynard, 'Nadir Shah' (1885).

Naegele, nā'gē-lē, **Charles Frederick,** American painter: b. Knoxville, Tenn., 8 May 1857. He studied figure and portrait painting under C. Myles Collier, William Sartain, and William M. Chase in New York. He has received many awards in competitive exhibitions and has painted portraits of Peter Cooper, Charles L. Tiffany, ex-Governor Roswell P. Flower, General Joseph D. Bryant, General Edwin A. McAlpin, John W. Gates, William Woodward Junior, Franklin V. Edson, and Waldo Hutchins.

Næ'nia, or **Nenia** (Latin), a funeral song among the ancients, sung generally by women. Nænia was also the goddess of lamentation.

Nævius, nē'vĭ-ŭs, **Gneius,** early Roman poet: b. probably in Campania between 274 and 264 B.C.; d. Utica, Africa, 204 B.C. or 202 B.C. He wrote in the old Saturnian verse an epic on the first Punic war; but was better known as a dramatic writer, particularly for his comedies. Most of his plays, of which the earliest was produced in 235 B.C., were translations or adaptations from the Greek. His attacks on the Metelli, of the Roman nobility, provoked their anger, and he was banished from the city, and retired to Utica. Fragments only of his works have come down to us. These have been edited by Klussmann, Vahlen, and most recently by Ribbeck ('Fragmenta Scænicorum Romanorum').

Næ'vus, a birth-mark or mother's mark. This disfigurement, which occurs most frequently on the head and trunk, but may also appear on the extremities, is essentially an enlargement of the minute veins, or venous capillaries, which are dilated, and anastomose or unite among themselves to form a vascular patch generally of a deep-red color. The lesion is confined to the upper layer of the true skin. No pulsations are observable in the nævus, but if the circulation in the neighborhood is obstructed in any way, turgescence is seen, and the color deepens. The familiar name of «mother's mark,» or «longing mark,» is applied



VIEW OF HARBOR AND CITY OF NAGASAKI.

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to nævus from a former belief that the lesion was the result of fear, fright, unnatural longing, or some such irritation acting upon the mother's constitution, and communicating its effects to the unborn child, in the shape of this mark. Nævus, apart from questions as to its exact cause, appears to be invariably congenital in its nature, and never to occur as a result of disease or accident. After birth it usually enlarges, and after attaining a certain size may remain to constitute a permanent lesion, or it may be absorbed with or without inflammatory action. Nævus has been treated in various ways, by excision with the knife, ligature, caustics, etc. The ligature has until recently been most commonly employed for its removal, threads being passed under the base of the nævus, and tied so as to produce strangulation of the vessels. Electropuncture and electrolysis are now much used, the latter being, where practicable, the best of all discovered means. In cases where a nævus is of limited extent, and does not produce disfigurement, or where from its situation it may not be seen at all in ordinary circumstances, the surgeon's advice generally is to let it alone. In subcutaneous nævus the lesion is more deeply seated. Subcutaneous nævus generally accompanies the more superficial form, but may bleed spontaneously, and weaken the patient unless removed.

Nafa, nä'fä, **Naba,** or **Nava,** Japan, the principal seaport town of the Liu-Kiu Islands, on Okinawa. It is on the west coast of the island, and carries on a considerable export trade in silk, cotton, and sugar. Pop. about 38,000.

Naftia, näf'tē-ä, **Lago,** or **Lago dei Palici,** Sicily, a historic lakelet of volcanic origin, in an ancient crater over 900 feet in circumference, near Palagonia, in Catania. Its nauseating naphtha-like emanations are fatal to birds and small animals; its waters thick and greenish, and in a frequent state of ebullition from the under-pressure of escaping carbonic acid gas. The lake was regarded with superstition by the ancients, and here the Siculi, the earliest known inhabitants, had a temple to two chthonic gods, the Palici of the Romans, which was the seat of the conspiracy and revolt against Rome 104 B.C.

Naga, nä'gä, Philippines, (1) a pueblo of the province of Cebú, situated on the east coast, 12 miles southwest of the town of Cebú. It is a port of call for steamers and coasting craft going to Cebú by the southern passage, and is on the east coast road. Pop. 15,100. (2) The former name of Nueva Cáceres (q.v.).

Nâga, in Hindu mythology, the name given various deified serpents, which are represented as the sons of the Muni Kasyapa and his wife Kadrii. Their king is Sesha, the sacred serpent of Vishnu.

Naga River, a river of southern Luzon, Philippines, rising in the mountains of the province of Albay, within four miles of the Pacific coast and flowing northwest to Bató Lake, on the boundary between Albay and Ambos Camarines. Passing through the lake, it continues its northwest course across Ambos Camarines, and empties into San Miguel Bay. Ten miles from its mouth is Nueva Cáceres, and about midway between this town and the bay the river makes a sweep in the shape of a horseshoe, turning toward the northeast. During its course it has three different names: from its source to Lake Bató it is called the Inaya; from the lake to Nueva Cáceres, Bicol or Vicol; and from Nueva Cáceres to its mouth, Naga. In the second part of its course it receives several important tributaries, is navigable for craft of some size, and forms the channel of trade in rice between Albay and Ambos Camarines. In the latter part of its course it receives the waters of Polanluna, which drains a large valley in the northwest of its province. It is navigable to Nueva Cáceres for vessels of 150 to 200 tons.

Nagano, nä'gä-nō, Japan, a city of Hondo, 96 miles northwest of Tokyo. It has an active trade in silks, woolens, and other textiles, and is a noted Buddhist pilgrim resort, visited for its celebrated Zenkoji Temple, dating from the 7th century.

Nagar, näg'är or nŭg'ŭr. See BEDNUR.

Nagasaki, nä-gä-sä'kē, Japan, an important treaty port, and the chief town of a prefecture, on the southwest coast of the island of Kiusiu, beautifully situated on a peninsula at the extremity of a bay or harbor, enclosed by hills covered with luxuriant verdure. The streets are wide and clean, while each house has a garden attached. The climate is mild and healthful. An extensive system of modern waterworks has been installed. Previous to 1858 the only European nation allowed to trade here was the Dutch, which has maintained commercial relations with the town for more than 200 years. In that year Nagasaki was one of five Japanese ports opened to the British and Americans, as well as the Dutch; and in October 1869 seven other Japanese ports were opened to most of the European nations, besides the United States. Nagasaki has a splendid harbor, which has been greatly improved by extensive dredging and other operations, and the port at present is the third in Japan. It has a patent slip- and two large graving-docks. In the neighborhood are some of the most productive coal-mines of Japan, and coal is one of the chief articles of export. Other exports are cuttlefish, grain and provisions, rice, flour, shell-fish, paper, cotton (raw and yarn), etc. The imports comprise sugar, rice, raw cotton, oil-cake, kerosene, machinery, metals, coal, locomotives, tobacco, etc. The number of vessels entered in 1899 was 1,096, and the gross tonnage 1,784,770. Ship-building is an important industry and the engine works of Aka-no-ura is its chief industrial establishment. Pop. about 125,000.

Nagcarlán, näg-kär-län', Philippines, a pueblo of the province of Laguna, Luzon, situated in the centre of the province between the headwaters of the Santa Cruz and the San Diego Rivers, 12 miles south of Santa Cruz. It is on the road between Majayjay and San Pablo. Pop. 13,000.

Nagel, nä'gĕl, **Albrecht Eduard,** German ophthalmologist: b. Dantzic, Germany, 14 June 1833; d. Tübingen, Germany, 24 July 1895. He studied medicine at Königsberg and Berlin and established a practice in Dantzic in 1856. In 1864 he was privat-docent at Tübingen and 1874 he became professor of ophthalmology there. He edited the 'Mittheilungen aus der ophthalmiatrischen Klinik in Tübingen' after 1880, and published: 'Das Sehen mit zwei Augen' (1861); 'Die Anomalien der Refraction und Accommodation des Auges' (1880); 'Die Vordbildung zum medicinischen Studium' (1890).

Nä-geli, nä'gē-lē, **Karl Wilhelm,** Swiss botanist: b. Kilchberg, near Zürich, 27 March 1817; d. Munich 10 May 1891. He studied in Zürich, Geneva, and Berlin; began (1842) the teaching of botany in Zurich; became extraordinary professor at the university there in 1848, full professor in 1852 at Freiburg, and at Zürich three years later. Afterward he held the professorship of botany at Munich. His most important work for science was in the physiology and morphology of plants. His writings deal chiefly with morphological and cytological subjects, and the transformation of species (see PROGRESSION, OF PROGRESSIVE EVOLUTION) is fully treated in his 'Mechanisch-physiologische Theorie der Abstammungslehre' (1883).

Naglee, năg'lē, **Henry Morris,** American soldier: b. Philadelphia 15 Jan. 1815; d. San Francisco 5 March 1886. Entering the Union army early in the Civil War, he participated in the Peninsular campaign of 1862, and in the following year was appointed to the command of the Seventh army corps and of the District of Virginia. He retired from the army in 1864, and later went to California, where he cultivated a vineyard at San José, and gave his name to a well-known brandy.

Nagoya, nä-gō'yä, Japan, the chief town of Owari province, Hondo, near the head of Owari Bay, 92 miles by rail east of Kioto. It was formerly a city of great importance, being for a time the capital of the empire. It is still the fourth city in Japan in respect of population and an important centre for the production of pottery and fancy ware, silk and cotton goods, and other manufactures. The chief edifices are the 17th century castle of Owari with its valuable art collection, and the Higashi Hongwanji Buddhist temple.

Nagpur, näg- or nŭg-poor', or **Nagpore,** India, a city, district, and division, of the Central Provinces. (1) The city, capital of the district and division, and also of the Central Provinces, 520 miles by rail east of Bombay, although at an elevation of 1,100 feet above sea-level, occupies an unhealthful situation on the banks of the Nag. The municipal limits include, besides the town proper, the native suburb of Sitabaldi, the European station of Sitabaldi, the small suburb of Takli, and a considerable area of land under cultivation. In the centre rises Sitabaldi Hill, crowned with the fort, which is garrisoned by a small detachment from the British regiment at Kamptee, 9 miles distant. There are some Hindu temples and mausolea built in the best style of Mahratta architecture, and several schools. The chief manufactures are cotton and woolen cloths. There is a trade in wheat and other grain, salt, country cloth, European piece and miscellaneous goods, silk, etc., and coal is obtained from a bed at a depth of 200 feet, which is estimated to contain 17,000,000 tons. Here, in 1817, a British force of 1,350 men defeated a Mahratta army of 18,000 men. Nagpur was formerly the seat of a line of rajahs, which became extinct in 1853, when their territory was annexed to the British dominions. Pop. about 125,000. (2) The district of Nagpur has an area of 3,483 square miles; pop. about 800,000; (3) the division of Nagpur, divided into five districts, has an area of 24,127 square miles; pop. about 2,900,000.

Nagrandians, or **Maribois,** a Central American tribe of Indians, formerly occupying Nicaragua, near the present site of Leon.

Naguilian, nä-gē-lē'än, **Philippines,** a pueblo of the province of Unión, Luzon, situated on the Bauang (or Baoang) River, four miles from the mouth and 10 miles southeast of San Fernando. Pop. 10,400. A small town (pop. 2,200) in the province of Isabela, Luzon, has the same name.

Nagyagite, a telluride of lead and gold agreeing with the formula $PbAu_2TeS$. Besides these elements it often contains traces of copper, silver, sulphur and antimony. It is found native in foliated masses and is hence sometimes called "foliated tellurium." It crystallizes, but rarely, in dimetric forms and its specific gravity is 6.85 to 7.2. It melts easily under the blowpipe and burns with a blue flame. In color it is lead gray, and of a brilliant metallic lustre. It is found in Virginia, but derives its name from Nagyag, Transylvania, where it was first found.

Nahant, na-hănt', Mass., town, in Essex County, on Massachusetts Bay. It is on a peninsula, which extends into the bay about four miles. The surface is uneven, the east coast rugged, in some places bold cliffs are along the shore; the west coast is low and more regular. There are two small villages in the town, one Nahant, the other Little Nahant. The whole peninsula is a residential section; many of the handsome dwellings are the summer homes of Boston men. Nahant is four miles from Lynn, the nearest railroad station, and about 10 miles northeast of Boston. Formerly it was part of Lynn, but in 1853 it was made a separate town. Pop. (1910) 1,184.

Na'hi Indians. See CREEKS.

Nahr-el-Asi, när'ĕl-ä'sē. See ORONTES.

Nahua (nä'wä) **Indians,** a Central American collective name given to the Indian tribes which were the most powerful in Mexico at the time of the Spanish conquest. They had many pueblos, or towns, knew how to cultivate the ground, were skilled in gold and feather work and used hieroglyphics in writing. About 2,000,000 Indians of that region are now classed as Nahuas. They are sometimes called Aztecs. See AZTEC CONFEDERACY.

Nahuel-Huapi, nä-wäl' wä-pē', or **Tiger Lake,** Argentina, a lake on the boundary between the territories of Neuquen and Rio Negro, on the east slope of the Andes. It is 75 miles long, 10 miles broad, and has an area of 300 square miles, dotted with several islands. It is fed by numerous mountain torrents and is drained by the Limay affluent of the Rio Negro.

Na'hum, one of the 12 minor Hebrew prophets succeeding Zephaniah as the foreteller of Nineveh's destruction. He flourished about 606 B.C. He is said to belong to Elkosh, an unknown place. He announces the fall of Nineveh, as Jehovah's judgment on that sinful city, and his method of releasing his people in captivity there. The prophecy opens with a sublime vision of God's coming to judge the nations. But he will save the righteous, while his enemies the Assyrians are utterly destroyed. The news of the tyrants' downfall will be welcomed by Israel. The capture of Nineveh by its foes (Medes and Chaldæans) is then described. The desolation of the city is a token of Israel's restoration. The fall of Thebes in Egypt (about 668 B.C.) is cited as an example of what is to happen to Assyria, in spite of its fortresses, its wealth and its armies. With a wide view of the working of Providence, an abstention from all moral or homiletic utterances, this powerful prophecy advances with majestic unity from its noble prooemium to its close.

Naiada'ceæ, a small family of aquatic plants differing from the *Potamogetonaceæ* (q.v.) in having the flower diclinous, with one stamen and one ovary.

Nail, an elastic horny plate on the upper or dorsal surface of the end of a finger or toe, as in man and monkeys. Hoofs, claws, talons, sheath-horns, and the bills of birds are analogous. Nails and claws of all kinds are modifications of the epidermis, identical in formation and mode of growth. The root of the nail rests in a matrix which is a fold of the dermis, particularly rich in vascular papillæ from which the nail-cells are produced. The pink color of a healthy nail is due to the blood beneath. The little white area toward the root of a nail, called lunula from its crescentic shape, has less blood under it. When nails are destroyed new ones will be formed if the matrix is uninjured. Nails are a support and a defense to the ends of the fingers and toes, assist in picking up small objects, and if healthy and in good condition add comeliness to the parts to which they are attached. To most animals possessing them they are of great importance, giving a needed rigidity to fingers and toes, and adapting them to a great variety of necessary utilities, as firmly seizing and holding prey (perfected in the retractile apparatus of feline claws), scratching, digging, searching crevices for food, and as formidable weapons. In horses, cattle, and other ungulated animals, they enclose some or all the digits, and are called hoofs (q.v.). In the sloths the nails assume a large relative size, and are used as a chief means in arboreal progression. In the Amphibia — as in some toads, efts, etc.— the nails are represented in their simplest form, and appear as mere thickenings of the skin at the extremities of the digits.

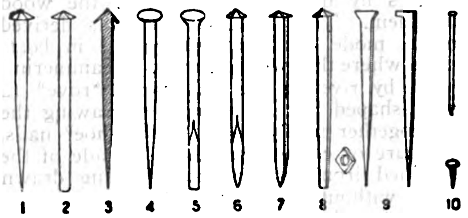
In man the nails appear about the fifth month of fœtal or embryonic life. After birth the nails of the hand grow at the rate of about one millimetre per week, those of the foot about one millimetre per month.

The health of the nails is affected, as is that of the skin, by local or general diseases. They may become thickened (hypertrophy) as the result of inflammation or a degeneration of nerves; diminished in size (atrophy) from traumatic influences; malformed as the result of disturbed function of the matrix; degenerated from faulty nutrition, and discolored in various diseases, the discoloration probably being in the tissues beneath. The nails are also subject to parasitic diseases. A hang-nail is a sliver of skin attached at one end; it should be cut off close to the point of attachment. The painful affection called ingrowing nail usually occurs in the great toe, not through alteration in the nail itself, but from constant pressure of the adjacent soft parts against its edge by a tight shoe. The irritation often results in the formation of an ulcer, extremely sensitive, and subject to continual aggravation from the imbedded nail.

Nails, headed spikes of metal, varying in size from those a little larger than ordinary pins to those several inches in length, and from $\frac{1}{16}$ to $\frac{1}{8}$ of an inch in thickness. Up to the beginning of the 19th century they were made entirely by hand, and constituted a household industry in various countries, married women, and children of both sexes being employed in their production under exceedingly unsatisfactory conditions. In England Birmingham was the centre of the industry, at one time giving employment to over 60,000 persons, and requiring a weekly supply of 200 tons of nail-rods from the iron-works of that district. In the United States New England held a corresponding position, and is even to-day the centre of the industry in America, with Taunton, Mass., as the great tack-making centre of the world. Almost all of the nail output of England was consumed at home, and similar conditions obtained in the United States, France, and Germany.

Hand-made nails were known as wrought or forged nails, and were made from metal plates rolled to the required thickness, and then slit by slitting-rollers into nail-rods or split-rods of various sizes, corresponding to the required size and character of the nails to be forged, and were sold to the nail-makers in bundles. The hand-nailer's outfit consisted of a forge for heating the nail-rods, an anvil (a small cube of steel), a hammer resembling that of a file-cutter (the face being sloped toward the handle), and a few «swages» (stamps or dies for producing ornamental or stamped heads).

To make a nail, a nail-rod was heated on the forge, hammered on the anvil, and a portion of it the length of the required nail was cut off on a chisel attached to the anvil. The head was shaped by the bore, a piece of iron 10 or 12 inches in length, having a steel knob at each end perforated with a hole the size of the shank of the nail, and countersunk to correspond with the kind of head required. Various forms of heads were produced by employing different kinds of bores. These forged or wrought nails included at least 300 different types, with at least 10 sizes in each type, representing a total of over 3,000 different names, all of which were perfectly understood by those who manufactured or used them. The retail terms — fourpenny, sixpenny, tenpenny, etc.— were not only indefinite in themselves, but



Principal Forms of Nails.

varied in different countries, and even in different localities of the same country. Therefore, they were generally designated by terms defining their use, as deck, scupper, pail, mop, hurdle, etc., or according to the forms of their heads, as clasp, rose, diamond, etc., or the shape of their points, as flat, sharp, spear, etc. Their thickness was expressed as fine, barbed, and strong, and their length in inches, generally in connection with the weight (expressed in pounds) of 1,000 of the nails referred to. Their principal forms are illustrated by the accompanying drawing, and their uses may be briefly stated as follows: (1) "Rose-sharp" and "fine-rose": the former used for coopering, fencing and other rough work employing hard wood; the latter, with broad spreading heads of greater holding power, used in pine and other soft woods. (2) "Flat-point rose": used in wood liable to split by the wedge-like action of sharp-pointed nails. They were driven with the edges of their flat points across the grain of the wood, and not only prevented splitting, but also held more firmly. (3) "Clasp" nails: commonly used by carpenters in deal and similar woods. The edges of their heads projected downward and, when driven below the surface of the wood, held tightly by clasping a portion of it together, and also allowed a plane to pass over them in finishing work. (4) "Clout" nails, with flat circular heads and round sharp-pointed shanks; used for nailing iron-work and other substances to wood. (5) "Counter-clout" nails, with countersinks under their heads, and chisel points: extensively used by wheelwrights and smiths. (6) "Fine-dog" and "strong-dog," with solid, slightly countersunk heads, round shanks and speared points: used for nailing down stout iron-work, in which the heads are not required to lie flush with the face of the metal. (7) "Kent-hurdle" and "Gate" nails, with broad thin rose heads, flat shanks and good spear-points: used for nailing together and clenching the oaken bars of hurdles, fences, and gates. (8) "Rose-clench" nails, with points cut square: used in nailing wood-sheathing, and the manufacture of packing-cases and boxes, in which the soft wood is liable to split unless bored before being nailed. The square heads of the nails punch out their own holes by driving a portion of the wood before them. The term "clench" was derived from the mode of their employment in boat-building, where they were clenched by hammering down or by riveting the end over a "rove" (a diamond-shaped metal plate), thus drawing the planks together firmly. (9) "Horseshoe" nails, with square or countersunk heads: made of the best refined iron, and capable of being drawn out fine without breaking in the hoof. (10) "Brads and tacks": a class of small very useful nails, employed for a variety of purposes too numerous to mention. The latter were sometimes made so small that 1,000 did not exceed 20 grains in weight.

The credit of inventing nail-making machinery appears to belong to the United States, which in 1786 granted a patent to Ezekiel Reed, of Bridgewater, Mass., for a "cut-nail" machine. About the beginning of the 19th century nail-making machines had been generally introduced in England, but the first English patent was granted to John Clifford in 1790. In making cut nails strips of metal of a breadth and thickness corresponding to the size and thickness of the required nail, and about a foot in length, are heated to a black heat and fed into the machine end first. A slicer cuts off the nail-blank, which in falling is clutched at the neck and held until a moving die strikes its upper end and forms the head; it is then liberated and passes out into the trough. In small nails the taper of the shanks and points is obtained by cutting the nail-blanks alternately, the metal strip (of uniform thickness) being turned over after each cut so that the points and heads are taken from the opposite sides of the blank; while in the larger nails the metal strip is rolled so that its cross section corresponds to the required taper. These machines turn out nails at a rate of 10 to 1,000 per minute, according to the size of the nails. Cast nails are produced by the ordinary process of molding in sand. They are relatively brittle, but are cheap, and are used for rough purposes, such as lathing and in the manufacture of stout boots and shoes. Wire nails were first made in France, hence sometimes called "French nails." They were used in the woodworking trades, and up to 1850 were made by hand. The wire was cut into the required lengths; a wire-blank was pinched in a vise, with a small portion projecting, which was flattened into a head by a few blows of the hammer. Subsequently machines were invented into which the wire was fed, and the cutting, heading, and pointing were performed automatically.

In the United States William Hersel, of New York, produced the first hand-made wire nails in 1850. Shortly afterward French machines were imported, but they were soon superseded by those of American make, which were awarded medals over those of French and German manufacturers at the Centennial Exhibition in 1876. The new industry, however, was of slow growth. Up to 1885 there were about 25 firms engaged in it, but since then these nails have been widely adopted in the manufacturing trades. They are now (1904) being produced by more than 80 plants in various parts of the United States, and are rapidly supplanting all the other forms of nails. With the exception of horseshoe nails, which to a large extent continue to be made by hand, from fine grades of wrought iron, all nails are now made of mild steel by machines. In the United States the production is in excess of the consumption, and American wire nails, especially, have been exported to European and other countries in increasing quantities for several years. The money value of the export of 1891 was but $420,697, while that of 1900 reached a total of $3,050,408. Consult: Smith, 'Treatise on Wire'; Swank, 'History and Manufacture of Iron in all Ages'; Reports of the Bureau of Statistics, United States Treasury Department.

W. Morey, Jr.,
Consulting Civil Engineer.

Nain Sing, Hindu explorer: b. Numaon; d. Morabad 1 Feb. 1882. He received from a military officer, Col. Montgomerie, instruction and stimulus for the work of exploration, which he afterward carried on in Central Asia, first in Cashmere and Ladak (1856–7), and later in Tibet, making a journey (1865–6) to Lhasa (q.v.), which won him recognition from the Royal Geographical Society. This was followed by other important journeys, chief of which was that across the Tibetan plateau (1874–5), of which he was the first explorer. The 'Geographical Magazine' (1876) published an account of this journey, with a map.

Naini Tal, India, a town and district of the United Provinces: (1) the town, capital of the district, has a beautiful situation besides a lake, 6,409 feet above sea-level, between spurs of the Himalayas, 70 miles north of Bareilly. It is a popular health resort, the summer headquarters of the provincial government, and has a military convalescent hospital. A disastrous landslip here in 1880 destroyed 150 lives. Pop. about 14,000. (2) The district has an area of 2,658 square miles.

Naipali (nī-pä'lē) **Language,** an Indian language spoken in Nepal. It resembles the Hindu. The literature of the language is very scanty.

Nairne, nārn, **Carolina Oliphant,** Baroness, Scottish poet: b. Gask, Perthshire, 16 Aug. 1766; d. there 26 Oct. 1845. Her father was a staunch Jacobite, and named her after the young Pretender. In 1806 she was married to her cousin, William Murray Nairne, who in 1824 became Baron Nairne. Her poems were issued in 1846 as 'Lays from Strathearn,' and in 1869 Charles Rogers edited a volume entitled 'The Life and Songs of the Baroness Nairne,' of which a revised edition appeared in 1886. Among her poems are several of the most popular Scottish songs, such as 'The Land o' the Leal'; 'The Laird o' Cockpen'; 'Caller Herrin'; 'The Auld House'; 'Charles is my Darling.'

Nairs, nä'ērz, a Mohammedan caste in Malabar, who have peculiar marriage customs, polygamy and polyandry thriving side by side.

Naissant. See Heraldry.

Nakshatra (Sanskrit, "celestial luminary" or "star"), in the Vedas simply means a star, but later was used of what in the mythological astronomy of India are called mansions of the moon, in which that planet periodically rests in its course through the heavens; these were small clusters of stars or asterisms, 27 or 28 in number. They were mythologically personified as the daughters of Daksha, and wives of the moon. Their introduction into the Hindu system has been variously accounted for. Consult: Thibaut on Hindu astronomy and astrology in Bühler, 'Grundriss der Indo-Arischen Philologie' (1899).

Nala, nä'lą, in Hindu mythology, a legendary king of ancient India, whose love for Damayanti, the daughter of Bhima, king of Vidarbha, and the adventures arising therefrom, forms a celebrated episode of the 'Mahâbhârata,' as also of a separate poem, the 'Nalodaya,' attributed to Kalidasa.

Naltunne Tunne (näl-tū-nä' tū-nä') **Indians,** an American tribe of the Athapascan family, formerly residing on the Pacific coast south of Rogue River, Oregon. A few descendants of the race now live on the Siletz reservation, Oregon.

Namaland. See Namaqualand.

Namangan, nä-män-gän', Russian Turkestan, a town of Ferghana, on the Sir-Daria, near the confluence of the Narin, about 50 miles northeast of Khokand. It is in a rich oasis, and is the trading centre for the surrounding nomadic tribes. Near it naphtha and coal are found.

Namaqualand, nä-mä'kwä-land, or **Namaland, Great** and **Little,** southwest Africa, territorial divisions occupying an extensive region bordering on the west coast, and separated by the Orange River; Great Namaqualand belonging to Germany, being north of the river, and Little Namaqualand, belonging to Great Britain, on the south. (1) Great Namaqualand extending along the west coast from the Orange River, lat. 28° 30' S., to Walfish Bay, lat. 23° S., and stretching inland from the west coast to the Kalahari Desert, has an estimated area of 100,000 square miles. It is mainly drained by the Oup, Borradaile, or Great Fish River, which, after a southerly course of about 450 miles, joins the Orange River. Along a coast-line of over 400 miles there is scarcely a running stream to be met with. There are several small bays in which safe anchorage may be had, such as Angra-Pequena, Sandwich Harbour, and Walfish Bay (q.v.) the latter with a small dependent territory belonging to Great Britain. The country is favorable for the rearing of cattle, which is the chief occupation. Copper ore appears to be in abundance in several localities, and in the vicinity of Kalahari Desert ivory and ostrich feathers are collected. The lion, giraffe, rhinoceros, and hippopotamus are still found in the north, although rapidly disappearing. The gemsbok, eland, and other large antelopes, now driven from Cape Colony, still find a refuge in the less frequented districts. The region is for the most part inhabited by the Namaquas, the principal existing tribe of the race generally known as Hottentots. The total number of Namaquas in Great and Little Namaqualand does not exceed 50,000; they lead a half-pastoral, half-predatory life, yielding allegiance to a number of petty chiefs. Polygamy is universal among them. They are gradually disappearing before the Griquas and other mixed races. The region has belonged to Germany since 1885, but little has been done toward its development. (See German Southwest Africa.) (2) Little Namaqualand, an electoral division of Cape Colony south of the Orange River, is a dry and barren region, but derives some importance from its copper mines. The chief mining station is Ookiep, 90 miles from Port Nolluth, with which it is connected by rail. Pop. 16,809, chiefly Namaquas and Griquas, and in the neighborhood of the mines, numerous Dutch farmers and English settlers.

Namas. See Hottentots.

Namaycush, the great lake-trout (q.v.).

Namby Pamby, a name bestowed upon Ambrose Philips (q.v.) (1671–1749).

Names of persons in the very earliest ages no doubt had some significance and meaning, but no record is handed down to us. The Old Testament names are almost all original, that is, given in the first instance to the individual bearing them, and either originated in some circumstance of birth or as an expression of some religious sentiment, thus — Jacob (supplanter), Isaac (laughter), Isaiah (salvation of Jehovah), etc. The names of women had equal significance: Rachel (ewe), Hannah (favor), Deborah (bee), etc. In Old Testament times the name was often changed on the occasion of an important event in one's life, Abram becoming Abraham, Jacob becoming Israel, and so on. Neither the Hebrews, Egyptians, Assyrians, Babylonians, Persians, nor Greeks had surnames; and in the earliest period of their history the same may be said of the Romans. In course of time, however, every Roman citizen had three, the prænomen or personal name, which was placed first, and commonly written with one or two letters, for example C. for Gaius, Cn. for Gneius, M. for Marcus, Q. for Quintus, and so on. Then followed the nomen, the name of the gens or clan, as Cornelius, Julius, Fabius, from the Cornelian, Julian, and Fabian gentes. Lastly came the cognomen or family name, as Cicero, Cæsar, Scipio, etc. Conquerors were occasionally complimented by the addition of a fourth name or agnomen, commemorative of their conquests, as Coriolanus, Africanus, Germanicus, etc. While the earliest Greek names were expressive of some quality in high estimation, as Callimachus (excellent fighter), Apollodorus (gift of Apollo), the Roman names were less dignified and ambitious in their origin; thus Porcius (swineherd), Cicero (vetch grower); some from personal peculiarities, as Naso (long-nosed), Paulus (little), Crassus (fat), Cocles (one-eyed). Celtic and Teutonic names had often equal significance, as Gottfried (God's peace), Conrad (bold in counsel), Bertha (brightness), Ethel (noble), etc. Times of great public excitement have had a very considerable influence in modifying the fashion in names. Thus the English Puritans preferred Old Testament names and such as directly expressed religious sentiment. Among the Scottish Covenanters Old Testament names were also prevalent. At the French Revolution the names of the most famous Greek and Roman republican heroes were in general favor.

The principle of the modern system of personal nomenclature now adopted in most countries in Europe is to have one name for the individual (Christian or baptismal name) joined to a second name which is common to the family to which he belongs (surname). It is impossible to state with any degree of certainty when this system became general. No instance is known, we believe, of any Anglo-Saxon family bearing a surname from generation to generation. They were introduced by the Norman adventurers, but were for centuries confined to the upper classes. Surnames became general in Scotland about the 12th century. In some of the wilder districts of Wales they can hardly be said to have been adopted even yet. The principal sources from which surnames are derived are personal characteristics, rank, or profession, localities, animals, or natural objects, and patronymics. Thus from the first source, personal characteristics, we have Black, Brown, Grey, Green, Whyte; Little, Long, Short, Broadhead, Lightfoot, Cruickshank. From rank or profession we have King, Prince, Pope, Bishop, Abbot, Prior, Stewart or Stuart, Smith, Wright, Carpenter, Taylor, Baker or Baxter, Weaver or Webster, Falconer, Fletcher (arrow-maker), Glover, Bowman, Chapman or Marchant, Miller, Brewer or Brewster, Shepherd. From localities, animals, or natural objects, come Hill, Dale, Wood, Forest, Brookes or Burns, Grove, Shaw; Bird, Lyon, Hogg, Crabbe, Fox, Roebuck, Bull; Stone, Tree, Flint, Steele. From patronymics are derived Andrews, Anderson; Alexander, Sanderson, Sandison; James, Jameson, Jamieson; Jones, Johnson, Jonson, Jackson; Williams, Williamson, Wills, Wilson; Thom, Thomson; Roberts, Robertson, Robinson. Surnames in many other languages are derived from like sources; thus Black, Whyte, Brown, are with the Germans Schwartz, Weiss, Braun; with the French, Lenoir, Leblanc, Lebrun; the Gaelic prefix Mac, the Irish O', the Norman-French Fitz, the German affix -sohn or -son, the Scandinavian -sen, the Russian -vitch, are all equivalents of the English affix -son. The Hebrews, as already stated, had no surnames proper, nor had the Arabians; but to distinguish two men of the same name the former used the form Solomon ben David (Solomon son of David), and the latter Abraham ibn Esra (Abraham son of Esra). The Welsh used the word ap in the same way; Evan ap Richard (John son of Richard). In most nations the wife changes her surname on marriage to that of her husband; in Spain, however, she retains it, while the son may adopt either the paternal or maternal name. In Great Britain a man may now change his Christian name and surname without an act of Parliament, royal license, or even public advertisement; but there is no law to compel third parties to use the new name. In the United States names can only be changed by special act of State legislatures.

Nicknames of persons are most difficult to classify owing to the great variety of origins. Physical peculiarities, complimentary (as Strongitharm), derogatory, as Spindleshanks, Sheepshanks, Crookshanks, Heavisides, etc.; mental attributes, as Grave, Stern, Wise, Sage, Moody, Proud, Courteous (Curteis), on one hand, and on the other Blythe, Gay, Foolhardy, Jolly, Meek, etc.; nicknames from complexion and color of the hair, as Black, White, Brown and Browning, Ruddy, Readman, Hoare, Grey, etc.; nicknames from peculiarities of dress, Curtmantel, Shorthose, etc.; from social position, as Bastard, Lacklands, and so on; from the animal and vegetable kingdoms, from birds and fishes. Then compounds were made by applying a sobriquet to a Christian name, as Micklejohn, Littlejohn, Brownjohn; if he was a comely, well made fellow, he was Properjohn. These names appear again in Norman guise, as Grosjean, Petijean, Bonjean, from which comes Bunyan — so that when we speak of good John Bunyan we are (perhaps unconsciously) only translating the name of "the inspired tinker." See NATIONAL NICKNAMES.

Bibliography.— Barber, 'British Family Names' (1894); Bardsley, 'Dictionary of English and Welsh Surnames' (1901); Innes, 'Concerning Some Scotch Surnames' (1860); Yonge, 'History of Christian Names' (1863).

Namouna, nā-moo-nā', in Persian mythology, an ever young and beautiful enchantress. born long before any other created thing, yet still retaining all her youthful attractiveness.

Namur, nā'moor (Fr. nā-mür'), Belgium; (1) a city, capital of the province of the same name, at the confluence of the Sambre and Meuse, 35 miles southeast of Brussels. The old fortifications have been razed since 1866 with the exception of the picturesque citadel dating from 1784, built upon steep rocks, high above the confluence of the rivers. A cordon of five large and four small modern forts now defend the town. The town is beautifully situated and well built, with spacious streets and several handsome squares. Frequent sieges and bombardments destroyed almost all its ancient buildings. Among those of more recent times are the cathedral dedicated to St. Aubin, one of the most handsome modern churches of Belgium; the church of St. Loup, the church of Notre Dame, the Hôtel de Ville, and the belfry tower. Namur is the seat of a bishop; it possesses a chamber of commerce, a royal athenæum, a public library, a museum, an agricultural society, normal and various other schools, and numerous benevolent institutions. Namur is famous for its cutlery, its leather-works, and its iron and brass foundries. The trade is greatly favored by the two navigable rivers. Steamers ply on the Meuse; and railways communicate with Brussels, Mons, and the French frontier. Namur dates from the 7th century, under the names of Namucum, Navinucum Castrum, and Namon. It was taken by Louis XIV. in 1692, and retaken by William III. of England in 1695. Pop. about 35,000. (2) The province is bounded on the north by Brabant, northeast by Liège, east by Luxemburg, south and southwest by France, and west by Hainaut; greatest length, north to south 57 miles; greatest breadth, 37 miles; area, 1,413 square miles. The surface is greatly diversified, well watered by the Meuse, with its tributaries, the Lesse and the Sambre. About one half of the whole surface is cultivated. The chief vegetable productions are the ordinary cereals, oil-seeds, chicory, fruit, and medicinal and dye plants. In some places the vine is cultivated. The extensive forests furnish good timber and the prevailing carboniferous strata yield coal, iron, limestone, etc. The industry of the province, both manufacturing and commercial, is largely developed. Namur was an independent county as early as the 10th century. At the close of the 12th century it came into the possession of the counts of Hainaut, and early in the 13th century fell to Peter of Courtenay, emperor of Constantinople. It was sold by his son Baldwin to Guy of Dampierre, count of Flanders, with whose descendants it remained till 1420, when it was purchased by Philip the Good, Duke of Burgundy, for 132,000 gold ducats, and afterward shared the fate of the other Burgundian states. Pop. about 350,000, nearly all of whom speak Walloon.

Nan-Chang-Fu, China, the chief town of the province of Kiang-si, 176 miles southeast of Hankow, on the Kan-Kiang, near its entrance into the Po-yang. It is noted for its porcelain industries. Pop. (est.) 150,000.

Nan-Che, China, a town in the province of Chekiang, 40 miles west of Yen-chow-fu, in a beautiful valley at the confluence of the Hwuychow with one of its affluents. It is neat and clean, about three miles in circuit, and carries on a considerable river trade with the towns above and below. Pop. (est.) 200,000.

Nan-Ning, China, a trading station, and treaty port in the province of Kwang-tung, 300 miles southwest of Canton, at the limit of navigation on the Yu-Kiang. Pop. (est.) 40,000.

Nana, a novel by Emile Zola, one of the Rougon-Macquart series, which appeared in 1880.

Nana Sahib, nä'nä sä'hĭb, Mahratta leader of the Sepoy rebellion: b. near Cawnpore 1825; d. Nepal about 1859. His real name was Dhandu Panth, and he was the adopted son of the last Mahratta peshwa of Poona, whose great wealth he inherited, but whose annual pension of about $400,000 was not continued to him by the British government. He lived as a native prince, moving in European society, and when the Sepoy mutiny broke out he secretly encouraged it, but openly offered aid to the English. He marched on Delhi at the head of native troops; promised the English a safe conduct from Cawnpore, but shot or drowned all of them but four; and before leaving the city killed all Europeans, women and children included, that he found in the city, and threw their bodies into the famous well of Cawnpore. He fled to Nepal, was repeatedly defeated by the English, and was not heard of after 1859.

Nanaimo, na-nī'mō, Canada, a seaport of British Columbia, on Departure Bay, on the east coast of Vancouver Island, opposite Vancouver on the mainland, with which it has daily steamer service. Its harbor is deep and safe, though often closed by ice in winter. It is connected with Victoria, 60 m. south, by the Esquimault and Nanaimo Railway. The coal mines at Nanaimo and in the vicinity produce more than a million tons a year. The city is the principal Pacific coaling-station for the British navy, and exports large quantities of coal and lumber to San Francisco and other places in the U. S. It also has extensive freestone quarries, large saw-mills, banks, and daily, semi-weekly, and weekly newspapers. Pop. about 7,000.

Nânak, nä'năk, **Nânek,** or **Nânuk,** Hindu religious leader, founder of the sect of the Sikhs: b. Talwandy (now Nankana), in Lahore, 1469; d. Kirtipur 1538. A member of the warrior caste, he early associated with Kabir, leader of a monotheistic sect, and came under other mystical influences. He traveled to all the holy places of India, made the pilgrimage to Mecca and Medina, and as a result of his studies of Brahmanism and Islam wrote the 'Adi-Granth,' which frequently quotes Kabir, and in general is a mixture of the Vedas and the Koran. This gospel he preached through India; it became the national religion of the Sikhs and was proclaimed by Nânak's successors from Labona down to Govind Sinh, who died in 1708. The 'Adi-Granth' preaches the worship of one god, the equality of man, the duty of loving all men, and the need for frequent ablution. See SIKHS.

Nan'crede, Charles Beylard, American surgeon: b. Philadelphia 30 Dec. 1847. He was graduated at the medical school of the University of Pennsylvania in 1869; practised in Philadelphia for 20 years; in 1889 became physician, professor of surgery, and surgeon in the University Hospital, University of Michigan; served with distinguished bravery in the Santiago campaign in 1898; contributed to the 'International Cyclopædia of Surgery,' to the 'Cyclopædia of

Diseases of the Nose and Throat,' to Parkes, 'Treatise on Surgery,' etc.; and wrote 'Principles of Surgery' (1899).

Nancy (Fr. nŏṅ-sē), France, the capital of ancient Lorraine, of the former department of Meurthe, and since 1872 of the department of Meurthe-et-Moselle, situated in a fertile plain, near the left bank of the Meurthe, 218 miles east of Paris, on the railway to Strasburg. It is divided into the old and the new town, and has extensive suburbs. The former is for the most part irregularly built, with streets narrow and winding; but has several fine public buildings. The new town has straight and spacious streets, intersecting each other at right angles, and traversed by tramways; the houses, almost without exception, are handsome. The Place Stanislas, surrounded by several fine public buildings, and communicating, by a triumphal arch, with the Place Carrière, has a fine statue of Stanislas Lesczynski, king of Poland, who passed the latter years of his life here as Duke of Lorraine, and bestowed upon the town many of its finest modern embellishments. There are statues also to Gen. Drouot, Thiers, and other notabilities. The Cours Léopold, occupying the highest part of the town, and finely planted, is the principal promenade; another is the Pépinière, a large planted area. Among the chief edifices are the cathedral, a modern structure in the Italian style; the church of St. Epvre, with a lofty tower and a fine portal, one of the finest specimens of modern Gothic in France; the church of the Cordeliers, built in 1484, and containing the tombs of several dukes of Lorraine; the 19th-century churches of St. Peter, St. Vincent, and St. Leon; Hôtel de Ville (17th century); ducal palace, an elegant specimen of flamboyant Gothic, with a fine porch (16th century); public library (88,000 volumes and 1,200 manuscripts); seven handsome gates or triumphal arches. Nancy is the see of a bishop, and the headquarters of the 20th army corps. At the head of its educational institutions is the celebrated university founded at Pont-à-Mousson in 1572 and removed to Nancy in 1768; it has faculties of law, philosophy, natural science, mathematics, medicine, and a school of pharmacy; Nancy also has a lyceum, a botanical garden, a school of forestry, a theological seminary, etc. The manufactures consist of broadcloth and other woolen stuffs; cottons and cotton yarn, hosiery, lace, all kinds of embroidery, stained paper, tobacco, etc. There are also ironworks, dye-works, breweries, and tanneries. The most memorable event in the annals of Nancy is the battle fought under its walls, when the Duke of Burgundy (Charles the Bold) was signally defeated and slain by René II., Duke of Lorraine. On 12 Aug. 1870 it surrendered to the Germans, by whom it was occupied until 1 Aug. 1873. The population was largely increased by the influx of Alsatians after the annexation of Alsace to Germany. Pop. about 110,000.

Nanda Devi, India, a peak of the main Himalayan Range, near the sources of the Ganges and the Brahmaputra, with a height of 25,656 feet.

Nandi, in Indian mythology, the goddess of joy and mirth.

Nan'du, a Brazilian name for the South American ostrich or rhea. See RHEA.

Nanek, or **Nanuk**. See NANAK.

Nanini, Giovanni Maria, jō-vän'nē mä-rē'ä nä-nē'nē, Italian composer: b. Vallerano, Italy, about 1540; d. Rome, Italy, 11 March 1607. He studied music in Rome and was appointed Maestro di Cappella there in 1571. In 1577 he became a member of the Pontifical Choir. His compositions are of great value, among them are: 'Hodie nobis Cœlorum Rex'; 'Cento cinquanta sette Contrappunti e Canoni'; etc.

Nankeen, or **Nanking Cloth**, a sort of cotton cloth, which takes its name from the city of Nanking, where it was originally manufactured. It was formerly imported extensively from China, but has generally been superseded by other fabrics. It is now imitated in most other countries where cotton goods are woven. The English manufactures have now so completely driven the Chinese from the market that large quantities are shipped from that country to Canton.

Nanking, nän-king' (officially *Kiangning*, that is, Southern Capital), China, capital of the province of Kiang-su, and vice-regal headquarters for the three provinces of Kiang-su, Kiang-si, and Ngan-hwei, near the right bank of the Yang-tse-Kiang, 560 miles south by east of Peking. It is 18 miles in circumference, and is surrounded by a wall 40 feet high. The principal streets are of moderate width, clean, well paved, and lined with handsome stores; but the houses are, in general, mean, and only one story high. The part of the city occupied by the Manchus is separated by a wall from the Chinese town. There are extensive manufactures of fine satin and crape, and the cotton cloth which foreigners call nankeen derives its name from this city; paper and ink of fine quality, and beautiful artificial flowers of pith paper, are produced here. Nanking is celebrated also for its scholars and literary atmosphere, having many large libraries and book stores.

Nanking was the capital of the Chinese empire from 1368 to 1403; but when the seat of government was transferred to Peking it lost its importance and a great part of its population, about a third of its area being now unoccupied. The only remarkable remains of royalty are the sepulchral Ming statues situated near the walls. The famous porcelain tower of 9 stories, and 260 feet in height, completed in 1432, was destroyed during the Taiping rebellion. The city was held from the spring of 1853 to July 1864 by the Taipings, who made it their capital. At its capture by the rebels and recapture by the Imperialists it suffered severely. By the French treaty of 1858 Nanking was made a treaty port, but never attained any importance as such, owing to the vicinity of Chinkiang-fu. Pop. estimated at 140,000.

Nanna, nän'nä, in Scandinavian mythology, the wife of Balder. When the blind god slew her husband, she threw herself on his funeral pile and was burned to death. See MYTHOLOGY.

Nan'nacus, or **Nannakos**, according to a Greek legend, the king who predicted Deucalion's flood.

Nansen, Fridtjof, frĕt'yŏf nän'sĕn, Norwegian Arctic explorer: b. Great Fröen, near Christiania, 10 Oct. 1861. He studied at Christiania University, and in 1882 made an Arctic voyage in a sealing vessel in order to have opportunities of studying animal life in the higher latitudes. On his return he was appointed curator of the Bergen Natural History Museum. In 1888 he crossed Greenland from sea to sea a little north of latitude 64°, an account of this journey being published in England in 1890, under the title 'Across Greenland.' He returned in 1889, and was appointed curator of the Museum of Comparative Anatomy in Christiania University. In 1893 he sailed on board a specially built steamer (the Fram) in the expectation that, entering the Polar ice in the neighborhood of the New Siberian Islands, he would be drifted by a current over the Pole and would come out on the east side of Greenland. This expectation was based on the fact that articles belonging to the Jeannette, an Arctic expedition vessel lost in 1881, had drifted in about three years from Bering Strait across the Polar regions to Greenland. After being carried to lat. 83° 59', he left the Fram and crew, and with a single companion, Lieutenant Johansen, and with sledges, dogs, and kayaks, took the ice. In this way he reached a higher latitude than any previously attained, 86° 14' (8 April 1895), and then turned southwestward to Franz Josef Land. There he spent the winter of 1895–6 and on 17 June 1896 fell in with members of the Jackson-Harmsworth expedition, with which he returned to Vardö. The Fram, under Captain Sverdrup, had reached lat. 85° 57', and had been for four months fast in the ice. Nansen was received everywhere with the greatest enthusiasm, and medals and other honors were conferred upon him, including a professorship of zoology in Christiania University. In 1897 he published an account of his voyage, which appeared in English as 'Farthest North,' certainly the most interesting of all narratives of Arctic travel. A translation of a work by him on 'Eskimo Life' was published in 1893.

Nantel, năn-tĕl', **Guillaume,** Canadian journalist and politician: b. St. Jerome, P. Q., 4 Nov. 1862. He received his education at the seminary of Saint Thérèse de Bainville and was admitted to the bar in 1875. He was editor of the St. Jerome 'La Minerve' and of 'Le Nord,' and in 1882 was elected to the Canadian Parliament and was re-elected in 1886, '90, '92. From 1887–92 he edited 'La Presse' at Montreal, and in 1897 founded 'La Monde Canadien.' He was minister of public works in 1891–6 and is a director in large railroad concerns. He published: 'Notre Nord-ouest provincial' (1888).

Nantes, nănts (Fr. nänt), France, capital of the department of Loire-Inférieure, and an important commercial port, on the right bank of the Loire, where it receives both the Erdre and the Sèvre, 248 miles by rail west-southwest of Paris. The Loire here forms a number of islands, two of which are among the finest quarters of the town, and are connected by several bridges. The situation, on an important navigable river, within 40 miles of the ocean, is advantageous for commerce, and has been enhanced since 1891 by the construction of a ship-canal to Saint Nazaire at the mouth of the Loire. Nantes is so well placed, and so regularly, and in some parts so splendidly built, that it justly ranks as one of the finest towns in France. It has a number of elegant squares; and its quays, which line the banks of the rivers, extend nearly five miles. The notable public edifices are the cathedral, in the flamboyant style, dating from the 15th century; the handsome modern church of St. Nicholas in the Gothic style of the 13th century, with a tower 278 feet high; the celebrated ducal castle, an edifice of the 14th century, partly modernized in the 16th, flanked with massive round towers; the palace of justice or law-courts, a large and handsome building; the Hôtel de Ville; the exchange, restored and enlarged in 1891; the museum of natural history; and the new museum (1897); the large picture-gallery; public library of 102,000 volumes; chapter-house, and Hôtel Dieu or infirmary. Nantes is the see of a bishop; it has courts of first resort and commerce, a chamber of commerce and exchange, a college, diocesan seminary, and secondary ecclesiastical school; a secondary school of medicine, and a hydrographical school of the first class. The manufactures consist of blankets, serge, flannel, printed stuffs, canvas, ships' boilers and machinery, cordage, chemical products, glue, ship biscuits, etc.; there are also cotton-mills, sugar-refineries, iron-works, glass-works, bleach-fields. Sardines and preserved meats are important articles among its industrial products. The building-docks are of great extent. Nantes carries on a large foreign trade, vessels of 1,700 tons now being able to reach the town. The trade includes a variety of articles both for the home, the colonial, and the foreign markets. Before the conquest of Gaul by the Romans, Nantes was the capital of the Nannetes. In 445 it valiantly withstood a siege of 60 days by the Huns. During the 9th century it was thrice taken by the Normans, and almost entirely ruined. In 1118, when it had again become prosperous, an accidental fire reduced the greater part of it to ashes. During the English wars in France it suffered much, repeatedly falling into the hands of opposite parties. For a long time it formed one of the most valuable possessions of the dukes of Brittany, but in 1499 the heiress of the dukedom, Anne of Brittany, who was born here, having married Louis XII., it passed with the rest of her possessions to the crown of France. The most memorable event connected with the history of Nantes is the famous edict (see EDICT OF NANTES) issued here by Henry IV., 30 April 1598, securing the Protestants in the free exercise of their religion, and making them eligible to all civil and military employments. This edict was revoked by Louis XIV. in 1685. The *noyades* or drownings of the monster Carrier during the Revolution were perpetrated here. (See CARRIER.) Pop. about 130,000.

Nantes, Edict of. See EDICT OF NANTES.

Nanteuil, Robert, French copperplate engraver: b. Rheims 1630; d. Paris 1678. His father-in-law, Nicolas Regnesson, was his first instructor and in 1647 he went to Paris and worked under the eye of Philippe de Champagne (q.v.). Louis XIV. appointed him designer and engraver to the king. He employed in his work a simple line which grew gradually thicker at the shade point and died away toward the high light in faint and fainter stipple points, in this way he produced the fine color values which characterize his engravings. In his portraits, of which about 200 exist, he exhibits powerful modeling and life-like drawing. Some of these latter works are after the paintings of Lebrun, Du Chastel, and others. He also executed some excellent pastels. Consult Loriquet, 'Robert Nanteuil' (1886).

Nanticoke, năn'tĭ-kōk, Pa., borough, in Luzerne County; on the Susquehanna River, and on the Delaware, L. & W., the Central of N. J., and the Pennsylvania R.R.'s; about 80 miles north by east of Harrisburg. It was settled about the middle of the 19th century, and incorporated as a borough in 1874.

It is situated in an anthracite coal region, and has extensive water power which is utilized in manufacturing. The industry contributing most to the wealth of the town is coal mining. The chief manufacturing establishments of the city are mining and agricultural implement works, large hosiery mills, knitting factories, canning factory, flour and grist mills, lumber mills, and cigar factories. It has considerable trade in coal, and its own manufactures. The government is administered under the original charter which provides for a burgess, who holds office three years, and a council. Pop. (1890) 10,044; (1900) 12,116; (1910) 18,877.

Nanticoke Indians, a former American tribe of the Algonquin family residing in Maryland. They were of very dark complexion and were notorious for their peculiar customs and ceremonies. The Iroquois made war upon them in 1678, and in 1722 only about 500 of them survived. Later they removed to southern New York, and afterward to Ohio, where they joined the Delawares.

Nantuck'et, Mass., town, county-seat of Nantucket County; embracing the islands of Nantucket, Tuckermuck, and Muskeget. It is about 25 miles from the mainland of the State and 100 miles southeast of Boston. On the north is Nantucket Sound, on the east and south the Atlantic Ocean, and on the west Muskeget Channel, which separates it from Martha's Vineyard. The main island, Nantucket, is about 15 miles long, and averages about two miles in width. The area of the whole town is about 60 square miles. The most populous part of the town is along the north shore of the largest island. There are several villages in the town, the largest, Nantucket, on Nantucket harbor, was founded in 1673. The first settlement was made in 1659, by a colony in charge of Thomas Macy, at the place called Madeget. Nantucket is a famous summer resort; the island is dotted with handsome summer villas. The residents claim that the climate is antagonistic to asthma, hay fever, and malaria.

At one time Nantucket was the headquarters of a great whaling industry, but the chief industries of the present (1904) are agriculture and fishing. A flourishing coastwise trade is carried on by a number of the islanders. Muskeget Park is one of the attractions. The town has a public library (the Athenæum), and the Coffin high school. At the "town meeting" the administrative officials are annually elected. Pop. (1900) 3,006; (1910) 2,962. Consult Hinchman, 'Early Settlers of Nantucket.'

Naoroji, now'rō-jē, **Dadabhai,** first Indian member of the English Parliament: b. Bombay 4 Sept. 1825. He is the son of a Parsi priest, and was educated in the Bombay school that developed into the Elphinstone School and College, where he was the first native professor of mathematics and natural philosophy (1854). In 1855 he went to England, where he has since, for the most part, resided. In 1867 he assisted in founding the East India Association; through his efforts in 1870 the civil service was opened to native Indians; and he accomplished much for the improvement of Indian finance and industries. He became prime minister to the Prince of Baroda in 1874; from 1875 to 1887 held important municipal and legislative positions; and in 1886 and 1893 was president of the Indian National Congress. For many years he was president of the London Indian Society. From 1892 to 1895, as a Liberal, he represented Central Finsbury in the House of Commons, and in the latter year was made a member of the royal commission formed to inquire into Indian expenditure, etc. He has written: 'England's Duties to India' (1867); 'The Wants and Means of India' (1870); articles collected in 1887; and 'Poverty and Un-British Rule in India' (1901).

Nap, or **Napoleon,** a card game played by two or more players, each of whom receives five cards. It is usually played for money, a fixed stake per trick being agreed on. When the player at the left of the dealer examines his cards he either declares to win one, two, three, four, or five tricks — the latter called "going nap"; or he "passes," that is, declines to play, being accordingly out of that game. If he declares any number of tricks less than five, the next player in order has an opportunity of declaring or passing, the one who declares the highest number of tricks being always the one who has to play. The first card played determines that trumps are to be of that suit for the game. Should the player declaring succeed in winning his number of tricks, he pockets a corresponding sum from each player, and the game recommences; should he fail, he has to pay to each player a sum corresponding to the number of tricks.

Napa, nā'pā, Cal., city, county-seat of Napa County; on the Napa River, and on the Southern Pacific railroad. It is in an agricultural region in which large quantities of fruit are raised; and in the vicinity is an extensive deposit of cement rock. It was settled in 1847 and in 1863 was incorporated. The city has excellent transportation facilities as the Napa River is navigable, thus making direct water communication with San Francisco and other cities. The chief manufactures are gloves, woolen goods, leather, shoes, and canned goods. There is a large trade in fruit, Portland cement (made at Napa Junction), and the manufactures of the city. The scenery around Napa is beautiful; some of the attractions are the petrified forests, the mineral springs, and the Napa Redwoods. It has the State Hospital for the Insane. Pop. (1910) 5,791.

Napanee, Canada, a port of entry and the county-seat of Lennox County, 24 miles west of Kingston, on the bay of Quinté, at the outlet of the Napanee River. It is the terminus of the Quinté & Napanee railroad, and is on the Grand Trunk railway. It has mills, factories, and a considerable grain trade.

Naperville, nā'pėr-vĭl, Ill., city, in Du Page County; on the Du Page River, and on the Chicago, Burlington & Quincy railroad; about 28 miles west of Chicago. It was settled in 1830 and in 1857 was incorporated. It is in an agricultural region, and in the vicinity are stone quarries. It is chiefly a residential city, the seat of the Northwestern College, established in 1861 under the auspices of the Evangelical Association. It has good public and parish schools and the Nichols Library. Pop. (1890) 2,216; (1900) 2,629; (1910) 3,449.

Naphtali, năf'ta-lī (Hebrew, «wrestler»), the 7th son of Jacob by Bilhah, Rachel's maid, one of the 12 patriarchs and eponymous founder of one of the 12 tribes of Israel. The territory of Naphtali lay to the northwest of the Sea of Galilee; of this tribe was Barak, the hero and deliverer of Israel in the days when Deborah, the wife of Lapidoth, judged Israel. This frontier tribe was exposed to the incursions of the adjoining heathen, and is specially mentioned in the Song of Deborah as among those who «jeoparded their lives under the death» in the battle against Jabin the Canaanite king. Tiglathpileser when he overran the north of Palestine carried off the whole population to Assyria, after which Naphtali disappears from history. The district became famous under the name of Galilee as the home of Jesus Christ and most of his apostles. Capernaum, Tiberias, Magdala and Chorazin lay within the ancient boundaries of the tribe of Naphtali.

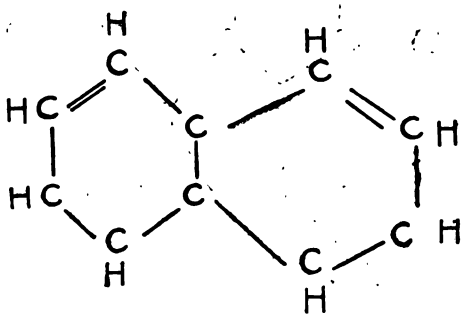
Naphtha, in chemistry, among the ancients, all inflammable liquids, especially the more fluid sorts of asphalt or bitumen; the word, which is of Persian origin and signifies «moist» being first used of Persian product and then applied more generally. In modern continental usage and among chemists the term is applied to any inflammable liquid product of organic decomposition. Thus mineral or native naphtha is only another name for kerosene or petroleum (q.v.). Commercially the word has still a third usage, for all the lighter products of petroleum distillation, namely the hydrocarbon spirits, as distinct from the safer and heavier hydrocarbon oils. Similar distillation products from coal-tar, peat, wood, india-rubber, bones, etc., are also called naphthas. These vary in density from 0.67 to 0.72, and in gravity from 90° to 60° Beaumé. American crude petroleum naphtha, which constitutes from 6 to 20 per cent of the crude petroleum, is refined into various grades, gasoline, benzine, and benzoline being the most important. Russian petroleum is only 5 or 6 per cent naphtha. Scotland produces a naphtha called shale-spirit, being 4 or 5 per cent of the crude shale oil, and rather heavier than most other naphthas, but not so heavy as the coal tar naphthas, which vary in specific gravity between .850 and .950. Caoutchine is another name for india-rubber naphtha. The uses of naphtha are various, the lighter grades being utilized as detergents in dyeing, clothes and glove cleaning; and the coal-tar naphthas are largely employed as solvents in making india-rubber goods. The Scotch shale-spirit is the most important component of a wood preservative. Naphtha in general, and gasoline in particular, are largely used for power producers in automobiles. Carburetting gas and the extraction of perfumes from flowers are two widely different uses of naphtha. The production of naphtha in the United States averages nearly 20,000,000 gallons annually. The figures for 1901 and 1902 are as follows:

NAPHTHA PRODUCTION IN THE UNITED STATES.

Year	Gallons	Value
1901	21,685,000	$1,742,000
1902	19,683,000	1,393,000

Naphtha-poisoning. See PETROLEUM-POISONING.

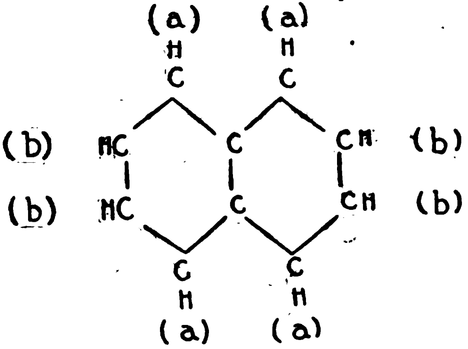
Naphthalene, or **Naphthalin**, a coal-tar product consisting of carbon and hydrogen, with the chemical composition $C_{10}H_8$, closely related to benzol. Its peculiar chemical composition may be represented by the graphic formula:



Naphthalene is prepared by the distillation of coal-tar at a temperature between 180° and 220° C. The residue crystallizes on cooling, is then compressed, warmed, after the addition of sulphuric acid, and either sublimated or distilled. Physically, naphthalene is a white solid, with brilliant, leafy crystals, melting at 80° C. to a colorless liquid, boiling at 218° C., combustible with a sooty flame and pitchy odor. It is insoluble in cold water, slightly soluble in water at a higher temperature, and easily soluble in the essences, in boiling alcohol, or in ether. Naphthalene forms various compounds, mostly by simple addition; the most important are the various sulphonic acids, such as $C_{10}H_7SO_3H + H_2O$, used in the manufacture of dyes. Mixed with camphor, to counteract its peculiar odor, naphthalene is used to keep moths and other insects from clothes. Consult Täuber and Norman, 'Die Derivate des Naphthalin welche für die Technik Interesse besitzen' (1896).

Naphthameïn, năf-thăm'ẹ-ĭn, a coal-tar color, obtained by treating an aqueous solution of naphthylamine hydrochloride with ferric chloride, naphthameïn then separating as an amorphous purple precipitate. Naphthameïn is insoluble in water, alkalies, and dilute mineral acids, but it dissolves readily in acetic acid and in ether. When used as a dye, it gives colors ranging from a gray-violet to a gray-brown; but the dye is not fast, and fades upon exposure to light. Naphthameïn is also known as «naphthalene violet,» and its chemical formula has not yet been definitely determined.

Naph'thol, in chemistry, a substance derived from naphthalene in the same way that phenol is derived from benzene,—that is, by replacing one of the hydrogen atoms of the hydrocarbon by a molecule of hydroxyl, OH. The empirical formula for naphthalene being $C_{10}H_8$, the corresponding formula for naphthol therefore is $C_{10}H_7.OH$. In benzene the substitution can be made in only one way, because the molecule of that substance is chemically symmetrical, its hydrogen atoms being all similarly related to one another, and to the carbon atoms. In naphthalene, however, two essentially different kinds of substitution are possible, according to the position of the hydrogen atom that is replaced. This will be understood by reference to the structural formula of naphthalene, as presented herewith. The hydrogen atoms in the positions marked "a" are more directly associated with the central pair of carbon atoms than are those in the positions marked "b"; and we must therefore admit that two chemically different naphthols are possible, according as the hydrogen that is replaced by hydroxyl is an "a" atom or a "b" atom. These two naphthols are in fact known, and to distinguish them from each other the prefixes "alpha" and "beta" are attached to the name. Thus "alpha-naphthol" is the compound obtained by replacing one of the "a" hydrogen atoms by OH, and "beta-naphthol" is the compound obtained by a similar replacement of a "b" atom. Both of the naphthols resemble ordinary phenol (or carbolic acid), and both are used as antiseptics, and also in the preparation of certain of the coal-tar colors. The naphthols exist in coal-tar, and may also be prepared by the action of sulphuric acid upon naphthalene, followed by treatment with sodium hydroxid; the actual details of the manufacture require considerable technical knowledge, however, and for them reference must be made to the advanced works on organic chemistry, and the chemistry of the coal-tar products. (See the references under COAL-TAR COLORS.) Alpha-naphthol crystallizes in short trimetric prisms, which melt at 201° F. and boil at 534° F. Beta-naphthol crystallizes in flat plates or tablets, melts at 253° F., and boils at 547° F. Both are slightly soluble in hot water, and both dissolve freely in alcohol, ether and benzene.



Naphthyl, a hydrocarbon radical $C_{10}H_7$, occurring in the compounds and derivatives of naphthalene. It is a merely hypothetical group as it appears only in compounds. If its existence be assumed, naphthalene ($C_{10}H_8$, or $C_{10}H_7.H$) is merely its hydrid; naphthol or naphthyl alcohol in the same way might be considered a hydrate of naphthyl, since its formula may be written $C_{10}H_7OH$. Dinaphthyl ($C_{20}H_{14}$) is a carbide formed by the action of heat upon napththalene; it is a solid and is fusible at 154° C.

Napier, nā'pĭ-ėr, SIR **Charles,** British naval commander, cousin of Sir Charles James and Sir William Napier (q.v.): b. Merchiston Hall, Stirlingshire, 6 March 1786; d. Merchiston Hall, Hampshire, 6 Nov. 1860. At 13 he entered the navy as a volunteer, and in 1805 was promoted lieutenant. In 1807 he became commander, and from the gallantry displayed by him in 1809 in the pursuit of three French line-of-battle ships, was shortly after made post-captain. Debarred from active service by his promotion, he joined the British army in Portugal and took part in the battle of Busaco. In 1814 he was despatched to the United States, where he led an expedition against Baltimore. In 1829 he received the command of the Galatea, in which he was employed on the coast of Portugal and the Azores. Becoming acquainted with the Duke of Terceira and other constitutionalists, he accepted the command of their fleet, and by his defeat of the Miguelites in a naval engagement effected the relief of Oporto and the establishment of Donna Maria on the throne. For his services the Portuguese government created him Viscount da Capo San Vincent, and nominated him admiral-in-chief. He soon returned to England, and in 1839 was ordered to the Mediterranean, where, on the outbreak of the war between Mehemet Ali and the Porte, and the co-operation of Britain with Russia and Austria on behalf of the latter power, he performed some of his most gallant exploits, including the storming of Sidon and the capture of Acre. Having blockaded Alexandria, he concluded on his own responsibility a convention with Mehemet Ali, by which the latter and his family were guaranteed in the hereditary sovereignty of Egypt on resigning all claim to Syria. In 1841 he was elected member for Marylebone, and proved himself a warm advocate of liberal measures and naval reform. In 1847, while in command of the Channel fleet, he compelled the emperor of Morocco to grant compensation for the injuries inflicted by him on British commerce. On the commencement of the Russian war he was nominated to the command of the Baltic fleet, but in this capacity had few opportunities for striking a decisive blow, which at the time somewhat disappointed his country. Sir Charles Napier was an author as well as a commander and published 'The War in Portugal' (1836); 'The War in Syria' (1842); 'The Navy, its Past and Present State' (1851). Consult: Elers Napier, 'Life and Correspondence of Admiral Sir Charles Napier' (1862).

Napier, SIR **Charles James,** English soldier and administrator: b. London 10 Aug. 1782; d. Oaklands, near Portsmouth, Hampshire, 29 Aug. 1853. He entered the army as ensign in his 12th year and within four months was gazetted lieutenant. Having become captain in 1803, he accompanied his regiment to the Peninsula, and distinguished himself at Coruña, where he had the rank of major, and where, after receiving five wounds, he was taken prisoner. In 1810, when again at liberty, he returned to the Peninsula, and fought at Busaco. After obtaining the rank of colonel, and taking part in most of the leading events of the Peninsular campaigns, he returned to England on the conclusion of the peace. He was in the United States during the War of 1812, and after his return took part in the storming of Cambrai in 1815. From 1822 to 1830 he was governor of the island of Cephalonia, where he pleased the inhabitants better than the authorities at home. In 1841 he sailed for the east to assume the chief command within the presidency of Bombay. He was shortly afterward called to Scinde, in consequence of the determination of Lord Ellenborough, then governor-general, to punish the Ameers for alleged misconduct during the Afghan war. This policy was ably carried out by Napier, first by the splendid victories of Meanee (17 Feb. 1843) and Hyderabad (24 March), and afterward by the administration of Scinde as a conquered province, of which Lord Ellenborough made him governor. He retired in 1841, but during the Sikh war of 1848-9 he sailed once more for the East as commander-in-chief of all the forces in India. Having taken a step which subjected him to an unceremonious rebuke from the Marquis of Dalhousie, the governor-general, he threw up his appointment and returned to England the next year. Consult: Bruce, ‘Life of General Sir Charles Napier’ (1885); Butler, ‘Sir Charles Napier’ (1890).

Napier, John, Scottish mathematician: b. Merchiston, near Edinburgh, 1550; d. there 4 April 1617. He was educated at St. Andrews, traveled on the Continent, returned to a life of proprietorship and leisurely study, and published in 1593 his ‘Plaine Discovery of the Whole Revelation of Saint John,’ in the dedicatory letter of which he proceeded to give James VI. some advice. For a time he busied himself with devising instruments of war, such as burning-glasses for firing hostile vessels; a piece of artillery for destroying everything round the arc of a circle; and a round metal chariot, from which shot might be fired through small openings while the enemy became “abased and altogether uncertain.” Sir Thomas Urquhart (‘The Jewel’ 1652) says that the artillery was tried on a Scottish plain with the slaughter of many sheep and cattle. His great work ‘Mirifici Logarithmorum Canonis Descriptio’ appeared in 1614. This explained the nature of logarithms (q.v.), then styled “artificial numbers,” and supplied the table for their application. It astonished Europe, and deeply interested Kepler, who helped to extend the use of logarithms. With Henry Briggs Napier devised the new canon in which 0 represented the logarithm of unity and 10,000,000,000 that of the entire sine. His ‘Mirifici Logarithmorum Canonis Constructio’ (1619) explained the method of constructing the table; and the ‘Rabdologiæ’ (1617) was a description of enumeration by bone or ivory rods, which, known as “Napier's rods,” were widely employed in Europe for assistance in multiplicaton, division, and the extraction of the square and cube root. Consult Mark Napier, ‘Memoirs’ (1834).

Napier, Robert Cornelis, LORD NAPIER OF MAGDALA, English soldier: b. Ceylon 6 Dec. 1810; d. London 14 Jan. 1890. Educated at the Military College, Addiscombe, he entered the Bengal Engineers, and during the second Sikh war (1848) was present as chief engineer at the siege of Multan, and after its fall took part in the battle of Gujarat. When the Mutiny broke out in 1857 he was appointed chief of the staff to Sir James Outram, and in the second relief of Lucknow it was he who constructed the engineering works which enabled Sir Colin Campbell to capture the city. In the Chinese campaign of 1860 he was second in command, and in 1865 became commander-in-chief of the Bombay army. He commanded in 1868 the expeditionary force against King Theodore of Abyssinia, defeated the king's forces, released the English prisoners, and stormed the mountain fortress of Magdala (April 1868). For his services in this short but brilliant campaign he was rewarded with a peerage and a pension. Subsequently he was appointed commander-in-chief in India (1870), governor of Gibraltar (1876), and constable of the Tower (1887). At his death he was buried in St. Paul's with military honors. Consult Markham, ‘History of the Abyssinian Expedition’ (1869), and Escott, ‘Pillars of the Empire’ (1879).

Napier, Sir William Francis Patrick, British soldier and author, brother of Sir Charles James Napier (q.v.): b. Castletown, Kildare, England, 17 Dec. 1785; d. Scinde House, Clapham, Surrey, 12 Feb. 1860. At 14 he entered the army, with his brothers Charles and George took a distinguished part in the Peninsular campaigns, receiving seven decorations for the share borne by him in as many principal actions, including Busaco, Salamanca, the Nivelle, and Orthez. Some years later he began his celebrated ‘History of the War in the Peninsula and in the South of France from 1807 to 1814’ (1828). It furnishes the best and most interesting record existing of the momentous transactions which it chronicles, though from its opposition to the prevailing politics of the day its merits were at first insufficiently appreciated. In 1841 he was advanced to the rank of major-general, was appointed lieutenant-governor of Guernsey the following year, and in 1848 created a K.C.B. Criticisms on his brother's proceedings in India called him forth as a champion on his behalf, and he produced successively the ‘Conquest of Scinde’ (1845); ‘History of Sir Charles Napier's Administration of Scinde’ (1851); and ‘Life and Opinions of the Late Sir Charles Napier’ (1857). He also wrote ‘English Battles and Sieges in the Peninsula.’ Consult ‘Life’ by Lord Aberdare (1864).

Napier of Magdala. See NAPIER, ROBERT CORNELIS.

Napier. The chief town and port of the District of Hawke's Hill, E. coast of North Island, New Zealand. It is the centre of a large district of squatters, and is rather wealthy for its size. Being a peninsula, it has excellent harbors. Its bay ranks with that of Naples for picturesqueness. The exports are wool, frozen meats. The town has freezing plants and a number of other prosperous industries. Its exports during 1908 were valued at £1,532,422; the imports, at £467,837. Napier is a famous winter resort.

Napier's Rods, in mathematics a set of rods contrived by John Napier in 1617 for the purpose of facilitating the numerical operations of multiplication and division. They consist of pieces of bone, or ivory, in the shape of a parallelopipedon, about three inches long and three tenths of an inch in width, the faces of each being divided into squares, which are again subdivided on 10 of the rods by diagonals into triangles, except the squares at the upper ends of the rods. See CALCULATING MACHINES.

Naples, nā'plz, Italy, the capital of the province of Naples, and previously of the former kingdom of the Two Sicilies (q.v.), the largest city and second seaport of the kingdom, situated on the celebrated Bay of Naples, 160 miles by rail southeast of Rome. Its site is of singular beauty, occupying an area about five miles long and three miles broad, on the north side of the nearly semicircular bay, partly along the shore and partly climbing the adjacent slopes. It is bounded on the one side by the picturesque heights of Posilipo, and on the other by the lofty, volcanic mass of Vesuvius (q.v.). The environs are densely peopled, among neighboring towns and villages being Portici, Resina, Castellamare, Casoria, Pozzuoli, etc., and the classic sites of Herculaneum and Pompeii (qq.v.) all connected by rail. The bay, 20 miles wide, and extending inward 10 miles, with a coast line of about 35 miles, has Cape Miseno as its northwest extremity, off which lie the islets of Procida and Ischia; Campanella Point forms the southeast extremity, with the beautiful isle of Capri lying beyond. The city is divided into two unequal parts by a steep ridge projecting from the height on which stands the castle of St. Elmo, and terminated by a rocky islet surmounted by the Castello dell' Ovo. The largest and most ancient part of Naples lies to the east of these heights. This now forms the business quarter and is intersected from north to south by the main street, the Via di Roma. The western and more modern part of the city, the fashionable quarter, has a superior situation, and commands magnificent views; the chief street in this quarter is the Corso Vittorio Emanuele, nearly three miles long. The streets are mostly well paved with lava or volcanic basalt, and the houses are large, lofty, and solidly built, and have flat roofs. Since the cholera epidemic of 1884 a plan of municipal improvement on an extensive scale has been carried out, including a new water supply, a modern sewerage system, the destruction of the narrow streets, alleys, and lanes, the former abodes of filth, misery, vice, and crime, and the building of new quarters, with wide thoroughfares and modern houses. There are few remains of ancient times, but there are five castles, dell' Ovo, Nuovo, del Carmine, Capuano, St. Elmo, the gates Porta del Carmine and Capuano, all of mediæval construction, and Virgil's tomb.

Among the chief public edifices is the cathedral, dating from 1272, a large Gothic building erected on the site of two temples dedicated to Neptune and Apollo. It is held in high veneration in consequence of possessing the relics of St. Januarius or Gennaro, including the phial of his blood which liquefies miraculously on certain occasions. Other edifices are the church De' Santi Apostoli, said to have been originally founded by Constantine the Great on the site of a temple of Mercury; the church of St. Paul, built in 1817–31 in imitation of the Pantheon at Rome; the Palazzo Reale (Royal Palace), a building of great size in the lower part of the town; the palace of Capo di Monte, situated on a height in the outskirts; the old palace, where the courts of justice now hold their sittings; the Palazzo dei Pubblici Studj, formerly occupied by the university, but now converted into the Museo Nazionale, a museum containing not only a valuable library of 275,000 volumes and many rare MSS., but also the older and more recent collections belonging to the crown, the Farnese collection of paintings and sculpture from Rome and Parma, and an unequaled collection of gems, bronzes, vases, etc., chiefly obtained from the excavations of Pompeii and Herculaneum. Naples has a university, dating from 1224, and attended by over 3,000 students; many other educational institutions, including the celebrated zoological station with marine aquarium and laboratory, and numerous hospitals and charitable foundations. The manufactures, which are numerous but individually unimportant, include macaroni, woolens and cottons, silks known as *gros de Naples,* glass, china, musical instruments, flowers and ornaments, perfumery, soap, chemicals, machinery, etc. The harbor accommodation has recently been extended, and the trade is important. The exports consist chiefly of bones, cream of tartar, hoops, linseed, hemp, wheat, figs, gloves, licorice, madder, coral, macaroni, oil, wine, wool, tallow, rags, and silk, raw, dyed, and manufactured. Naples is one of the most densely populated cities of Europe, and one of the features of the city is its unique population, which swarms incessantly in the thoroughfares, where throngs of sellers, buyers, and idlers intermingle with asses, mules, hand carts, and vehicles, dazzling the eye with their brilliant variety of costume, and the expressiveness of their frantic gestures and attitudes, while the ear is stunned by the shrill cries of the itinerant dealers, the songs of the improvisatore, and the high-pitched patois of the seething crowds. The Marinella, an open beach fronting the east part of the city, was formerly the abode of the lazzaroni, a class which has now lost its distinctive features, the term being now generally applied to the fishermen.

Naples was founded by a Greek colony from the town of Cumæ many centuries before Christ. It took the name of Neapolis ("New City") to distinguish it from a still older Greek city adjoining called Parthenope. It passed to the Romans in 290 B.C. In 536 A.D. it was taken by Belisarius, and was pillaged by Totila in 542. In 1130 the Norman Robert Guiscard united the south of Italy and the adjacent island of Sicily into one political unity, Naples being recognized as the metropolis. It was afterward successively under the sway of the emperors of Germany, and the kings of France and Spain. Under the latter it became the capital of an independent kingdom, but having been brought within the vortex of the French Revolution, was handed over by Napoleon, first to his brother Joseph, and then to his brother-in-law Murat. The Congress of Vienna having restored the legitimate sovereignty, Naples received back its former masters. After a long period of misrule they were ejected by Garibaldi in 1860, and Naples was then incorporated into the kingdom of Italy. Pop. about 600,000.

Naples Yellow, or **Neapolitan Yellow,** a permanent orange-yellow pigment much used in oil painting and in glass and porcelain painting. It is prepared by fusing at a moderate heat, for two hours, a mixture of chemically pure antimonis-tartrate of potash, lead nitrate and sodium-chloride. When cooled the common salt dissolves, leaving a fine yellow powder.

Napo, nä'pō, Ecuador, an affluent of the Amazon, which rises on the north side of Cotópaxi, and after a southeasterly course of about 800 miles, forming for a considerable distance the boundary between Colombia and Ecuador, joins the Amazon just beyond the eastern boundary, at Corocha, Peru. It is navigable nearly 500 miles for steamers; it flows through a region rich in mineral and vegetable wealth, but comparatively destitute of inhabitants.

Napoleon I., emperor of the French: b. Ajaccio, Corsica, 15 Aug. 1769; d. Longwood, Saint Helena, 5 May 1821. He was descended from the Italian family of Bonaparte (q.v.), of which the Corsican branch through him became the historic representative. Napoleon Bonaparte was the son of Charles Bonaparte, an advocate of some repute, and of Letitia Ramolino, whose family were Florentines. Of 13 children born to them, he was the fourth, and was the second son. At 10 he was sent to the military school of Brienne, where he remained till 1784. His school companions regarded him as taciturn and morose; but as he was a Corsican, speaking very little French, and poor as well as proud, his conduct is doubtless to be ascribed as much to his circumstances as to his temperament. Toward those who, like Bourrienne, showed him sympathy, he was susceptible of strong and lasting attachments. From the annual report of the school it appears that he «distinguished himself in mathematics, was tolerably versed in history and geography, weak in Latin, general literature, and other accomplishments; of regular habits, well behaved and studious, and enjoying excellent health.» His favorite author was Plutarch. In October 1784 he repaired to the military school at Paris to complete his studies for the army; and in September 1785 received his commission as second lieutenant in the artillery regiment of La Fère. Soon afterward he was promoted to be first lieutenant in the regiment of Grenoble, then stationed at Valence. While here he devoted some attention to literature, gaining a prize offered by the Lyons Academy. He had the intention of describing an excursion he made to Mont Cenis in the style of Sterne's 'Sentimental Journey,' then much in favor on the Continent; but a much more suitable task was a 'History of Corsica,' which he began and communicated to Paoli, then living in exile in London.

Meantime the Revolution was rapidly developing. Many of Napoleon's fellow officers at Valence openly took part with the royalists, but he chose the popular side, though in a quiet and undemonstrative way, as he had little liking for the turbulence of mobs. On 6 Feb. 1792 he became captain of artillery by seniority and, being in Paris the same year, he witnessed the insurrections of 20 June and 10 August. He was accompanied by his friend and biographer Bourrienne (q.v.), who relates that on one of these occasions, when Napoleon saw the mob break into the Tuileries and force the king to don the red cap, he exclaimed, «It is all over with that poor man! A few discharges of grape would have sent all those despicable wretches fleeing!» Soon after he left for Corsica, where Paoli then held the chief command. The excesses of the Septembrists and Terrorists, however, induced Paoli to break with the Convention and seek the assistance of England. This brought him into conflict with Napoleon, who adhered to the Convention, which so exasperated the Corsicans against him that after a few skirmishes he was driven from the island along with his whole family. He made a short stay at Marseilles, where he published a small pamphlet, 'Le Souper de Beaucaire,' Republican in sentiment, but not Jacobinical, as has been asserted. He then set out for Paris, where he spent a part of the summer of 1793; and in September of that year was sent, with the commission of lieutenant-colonel of artillery, to assist in the reduction of Toulon, then in the hands of the English. The place was captured 19 December entirely through his strategic genius; and in the following February he was made a brigadier-general of artillery. Later in the year he was sent to Genoa to examine the state of the defenses of that city and to ascertain the political disposition of its inhabitants.

In the beginning of 1795 he was again in Paris in search of employment, but in spite of his known abilities was not at first successful. In his letters to his brother Joseph, written about this time, he complains of poverty and ennui, and seems to have thought of offering his services to the Sultan of Turkey. On the 13th Vendémiaire IV. (5 Oct. 1795), when the sections of Paris had risen against the Convention, Napoleon, named by Barras (q.v.), was commander of the 5,000 troops provided for its defense. Although he had had but a night in which to make arrangements for the dispersion of the populace, when the National Guards, as the defenders of the sections were called, advanced to the number of 30,000 along the quays of the Seine, the Rue St. Honoré, and the other approaches to the Tuileries, they found every point securely guarded. To their feeble musketry fire Napoleon replied by murderous discharges of grape. In less than an hour of actual fighting victory was secured for the Convention, which recognized the value of the young victor's services by appointing him to the command of the Army of the Interior.

About this time he made the acquaintance of Josephine Beauharnais, to whom he proposed marriage and was accepted. The ceremony took place 9 March 1796, and less than a week afterward he had to depart to assume the command of the army of Italy, which for three or four years had been carrying on a desultory warfare against the Sardinians and the Austrians amid the defiles of the Alps and the Ligurian Apennines. His army consisted of only 40,000 men, and even those were badly fed and clothed, while the allies could oppose him with a much larger force. In the end of March he set out from Nice and came up with the allies at Montenotte, and inflicted on them a disastrous defeat (11 April). This victory separated the Sardinian from the Austrian army, and Napoleon, determined to crush them in detail, pursued the former and beat them at Millesimo (13th and 14th), and then fell on the latter at Dego (14th and 15th).

This opened up for him both the route to Turin and to Milan. Napoleon lost no time; the Sardinians, who were retiring upon Turin, were overtaken and beaten at Mondovi (22d), and compelled to sue for peace; and the Austrians, who were falling back on Milan, were signally defeated at the battle of Lodi (10 May). On the 15th he entered Milan, where heavy contributions were levied on the state, and the principal works of art were seized and sent to Paris. Naples, Modena, and Parma hastened to conclude a peace; the Pope was compelled to sign an armistice; and the whole of northern Italy was in the hands of the French. Mantua was the next object of attack. Wurmser, at the head of large Austrian reinforcements, advanced through the Tyrol to its defense; he was defeated at Castiglione 5 August and again at Bassano 8 September, which compelled him to take refuge behind the walls of Mantua. Not yet disheartened, Austria sent a third army in two divisions under Marshal Alvinczy and General Davidovich. This for a while held the French in check, but on 15 November a battle was begun at Arcole, which, after three days of hard fighting, gave the victory again to the French, and decided the result of the campaign. In January 1797, Alvinczy opened a fresh campaign by advancing at the head of 50,000 troops from Roveredo to the relief of Mantua, but was completely routed by Napoleon on the 14th at Rivoli; and on 2 February Wurmser was compelled by famine to surrender at Mantua. On the same day Napoleon put an end to the armistice with the Pope, and invaded the States of the Church, beat the papal troops on the Senio, and took in quick succession the towns of Faenza, Ancona, Loretto, and Tolentino. On the 19th the Pope was compelled to conclude a peace by which he surrendered Avignon, Bologna, Ferrara, and the Romagna to France. Napoleon next entered the Tyrol, driving before him the Archduke Charles, who had undertaken another invasion of Italy. An armistice was agreed upon, 7 April, and Austria gave territory and indemnity to France, receiving Venetia in return. This closed the great Italian campaigns, in which Napoleon, by ingenuity of plan, celerity of movement, and audacity in assault, far outgeneraled all his antagonists.

In December 1797 Napoleon returned to Paris; the enthusiasm of the Parisians was immense, and the festivals in his honor innumerable. About this time the Directory seems to have had the intention of invading England, and had brought an army together for that purpose. The command was conferred on Napoleon, who at first professed to favor the design, but who well knew its impracticability. It has been thought by many that this proposal was merely a feint to cover the real design of the Directory, namely, the invasion of Egypt, as a preliminary step to the conquest of British India. By 10 May 1798 an army of 36,000 men was collected and embarked at Toulon in a fleet commanded by Brueis (q.v.). A body of scientific and artistic explorers accompanied it. On 9 June the French landed at Malta, and the next day took possession of the island, in which they left a garrison. Ten days after the fleet resumed its voyage, reaching Alexandria on 1 July, and that city being taken, Napoleon and the army advanced on Cairo. Here they encountered a large body of Mamelukes, which, after a long and bloody struggle, known as the battle of the Pyramids, they repulsed. Many of the surrounding tribes thereupon submitted to the French, who thus for a while held a seeming possession of the whole of Egypt. Thinking himself secure in his conquest Napoleon immediately set about reorganizing the civil and military government of the country; but fortune was preparing for him a terrible reverse. The English admiral Nelson, who had long been in pursuit of his fleet, found it moored in the bay of Abukir, and, with the exception of four vessels which contrived to escape, utterly destroyed it.

All means of return to Europe for the French were thus cut off, and to add to their misfortunes the sultan declared war against them, and a short time after serious disturbances broke out in Cairo, which were only suppressed by horrible massacres. Napoleon resolved to meet the Turkish forces assembling in Syria. In February 1799 he crossed the desert with about 13,000 men; took El-Arish and Gaza, and stormed Jaffa, where a great number of Turkish prisoners were deliberately massacred. On the 17th he reached Acre, which was defended by a Turkish garrison under Djezzar Pasha, assisted by Sir Sydney Smith and a small body of English sailors and marines. After 60 days he gave up the siege and returned to Egypt, leaving the whole country on fire behind him. He reentered Cairo 14 June, having lost 4,000 men in the Syrian expedition. About the middle of July the sultan landed a force of 18,000 at Abukir, which Napoleon attacked and almost annihilated on the 25th. His position was far from agreeable, however; he had signally failed in the great objects of his expedition, and besides news had reached him of disaster to the French arms in Italy and of confusion in Paris. On 22 August he embarked in a frigate and 9 October landed at Fréjus, having narrowly escaped capture several times by the British Mediterranean cruisers. He arrived in Paris in time to take advantage of the political intrigues then rife. The credit of the government was wholly gone, and its authority over its generals impaired. A revolution in the government 18 June had not made new directors more competent than their predecessors. Another change became necessary. Napoleon secured the co-operation of Moreau and the other generals then in the capital, and abolished the Directory on the 18th and 19th Brumaire (9–10 November). A new constitution was then drawn up, chiefly by the Abbé Siéyès, under which Napoleon was made first consul. As, however, he had the power of appointing to all public offices, of proposing all public measures in peace and in war, and the entire command of all administrative affairs, both civil and military, he was virtually ruler of France.

From this time Napoleon's policy developed itself more distinctly; its objects were to establish order at home and to humiliate the enemies of the nation; but personal aggrandizement was an end scarcely less conspicuous. With sagacity, activity, and boldness he undertook to reform civil affairs. He recruited the national treasury by various expedients, repealed the more violent laws passed during the Revolution, such as punishment for matters of opinion, reopened the churches and suppressed the Vendean insurrection by a series of decided but conciliatory measures. But he was well aware that his genius was essentially military, and that his most

NAPOLEON BONAPARTE.

AFTER A PAINTING BY PAUL DELAROCHE.

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striking triumphs were those won on the battlefield. He offered Austria, England, and Turkey, in theatrical phrases, terms of peace, which were rejected. He resolved to strike a blow first at Austria by a renewal of the glories of his former Italian campaign. An army of 36,000 men was concentrated with unparalleled rapidity and secrecy on the shores of the Lake of Geneva. On 13 May 1800 he began his daring march across the Great Saint Bernard, and almost before the Austrian General Melas was aware, had entered Milan (2 June). After several unimportant skirmishes he encountered the Austrians at Marengo (14 June), where he achieved another brilliant victory, which put all the Piedmontese fortresses, for the second time, in possession of the French.

Having established provisional government at Milan, Turin, and Genoa, he returned to Paris 3 July. As his general, Moreau, had defeated the Archduke John in the decisive battle of Hohenlinden (3 December), Austria was reduced to sue for peace, and on 9 Feb. 1801 signed the treaty of Lunéville, which was mainly based on that of Campo Formio. Treaties were subsequently concluded with Spain, Naples, the Pope, Bavaria, Portugal, Russia, Turkey, and finally, 27 March 1802, the Peace of Amiens. Thus it seemed as if a universal cessation of hostilities were about to mark the history of Europe, and allow Napoleon the opportunity to crush the insurrection of the blacks in San Domingo. An army was sent out under Leclerc, some 20,000 of which were swept away by disease or the sword; the blacks were provoked by brutal cruelties to still more fearful massacres, in which about 60,000 whites perished. Toussaint l'Ouverture, an able and courageous negro who had made himself the leader of his unfortunate countrymen, was seized during a truce and carried to France, where he died in prison.

But the great occupation of Napoleon was the improvement of the interior affairs of the nation. A general amnesty allowed all the *émigrés* to return home; the Legion of Honor, a new order of knighthood, was established. Considerable attention was paid to such departments of education as tended to promote efficiency in the public service. Mathematics and physical science were encouraged at the expense of philosophy, ethics, and social and political science. All prefects of departments and all mayors of cities were appointed by Napoleon, so that not a vestige of provincial or municipal freedom remained. On 2 Aug. 1802, Napoleon was proclaimed by a decree of the senate consul for life, a step confirmed by a plebiscite of 3,000,000 votes. A *senatus consultum* issued some days after, reconstructing the electoral bodies and reducing the tribunate to 50 members, showed, however, that Napoleon was not yet satisfied with the authority he was clothed with, and many persons saw in the movement a step toward still more absolute power. It is to this period that the greatest of his services to France belongs. He assembled the first lawyers in the nation, under the presidency of Cambacérès, to draw up a code of civil laws. (See CODE, *Code Napoléon.*)

Meanwhile the state of Europe was beginning to look serious. Disturbances in Switzerland in the early part of 1802 induced Napoleon to resort to an armed mediation in its affairs; in August of the same year Elba was incorporated with France, Piedmont 11 September, and Parma in October. England regarded these proceedings as an infringement of the treaty of Amiens, and as remonstrances were ineffectual, there was in a short time a resumption of hostilities. On 18 May 1803, England declared war against France, having laid an embargo on all French ships in British ports. France retaliated by a decree that all Englishmen found on her territory should be detained as prisoners of war; and General Mortier was sent to occupy Hanover, as belonging to Great Britain. While these events were taking place a conspiracy for the overthrow of the first consul and the re-establishment of the Bourbons was discovered and thwarted. Napoleon pretended to see an accomplice of the conspirators in the Duc d'Enghien, and caused him to be arrested in neutral territory, brought to Vincennes and, after a mock trial, shot. Napoleon now seems to have thought it necessary that he should assume the imperial dignity. An appeal was made to the nation, and upward of 3,000,000 votes were given in favor of conferring on him the title and prerogatives of emperor, while less than 3,000 were against it. On 18 May 1804 Napoleon assumed the imperial title; and in order that due solemnity should not be wanting, he requested Pius VII. to perform the ceremony of his coronation. The Pope assented and went to Paris 2 December. He was only allowed to perform part of the ceremony, however, as Napoleon snatched the crown from the pontiff's hands and placed it on his own head, performing a like office for his consort Josephine. On 26 May 1805 he was also crowned king of Italy in the Cathedral of Milan; and Eugène Beauharnais, his stepson, was appointed viceroy. He created a nobility with sounding titles; surrounded himself by a brilliant court; established all the etiquette of royalty; and introduced many practices marked by ostentation and parade.

Meanwhile the Northern powers listened to the solicitations of England, and united in a coalition against the new emperor. Russia, Austria, and Sweden all joined in the charges of aggrandizement laid against Napoleon by the English government; but Prussia, tempted by him with the promise of Hanover, could not be brought to enter the coalition. The emperor abandoned his design of making a descent on England, broke up the camp at Boulogne, and concentrating his widely scattered forces at Mainz, September 1805, he marched at once across Bavaria at the head of 180,000 men, and compelled the Austrian general Mack to capitulate at Ulm, with 23,000 men (20 October). On 13 November he had reached Schönbrunn, near Vienna, where he received news of the victory of Nelson at Trafalgar, over the united fleets of France and Spain. Entering the Austrian capital, he made rapid preparations to meet the combined armies of Russia and Austria, then concentrating on the plains of Olmütz. On 2 December the three armies, each commanded by an emperor, met at Austerlitz. The struggle was desperate and long but at last victory was won by Napoleon. The rout of the allies was complete. The Austrian emperor instantly sued for peace, giving up to France all his Italian and Adriatic territories. The Russian emperor retired behind his own frontiers, and Hanover was handed over to Prussia. As the king of Naples had received English and Russian troops into his dominions, Napoleon construed this act into one of direct hostility. In February 1806 a French army occupied the continental part of the Neapolitan States, of which Joseph Bonaparte was declared king on the deposition of their former sovereign. The Batavian republic was transformed into a kingdom dependent on France and given to another brother of the emperor, Louis, who took the title of King of Holland. Various districts in Germany and Italy were erected by the conqueror into dukedoms and bestowed on his most successful generals.

But the most important change of all was the formation of the Confederation of the Rhine on 12 July, and the dissolution of the old German empire. On the death of the English minister, Pitt, and the accession of Fox, negotiations were entered into for the cessation of hostilities between France and England, and as propositions were entertained toward the restoration of Hanover, the eyes of the Prussians were at once opened, and war, however hazardous, was determined on and was declared on 8 October, the emperor being already at Bamberg directing the movements of his troops, who had remained in Germany. On the 14th Napoleon met the enemy at Jena, and inflicted on them a severe defeat; while his general, Davout, added on the same day to the French triumph by the brilliant victory of Auerstädt. On the 27th Napoleon entered the Prussian capital. After garrisoning all the important fortresses and reducing such towns as made a show of resistance, he issued the celebrated Berlin decree (see CONTINENTAL SYSTEM), directed against English commerce. This policy nearly ruined the commerce of France and the other European nations, while it increased the prosperity of England. Her fleets and cruisers swept the seas; nothing could be obtained from the colonies save through her, and the continental merchants engaged in an extensive smuggling trade with the British, which it was impossible to prevent.

After the capture of Berlin Napoleon marched north against the Russians, who were advancing to assist the Prussians. He called on the Poles to rise, but was answered with little enthusiasm. At Pultusk 28 Dec. 1806, and at Eylau 8 Feb. 1807 he met with severe checks, and retired on the line of the Vistula; in the course of a few months, however, having received heavy reinforcements, he once more took the offensive. On 14 June was fought the battle of Friedland, which was so disastrous to the Russian arms that Alexander was compelled to sue for an armistice. The Peace of Tilsit was concluded 7–9 July, and by it the king of Prussia received back half of his dominions, and Russia undertook to close her ports against British vessels. The duchy of Warsaw was erected into a kingdom and given to the king of Saxony; out of the Prussian territories west of the Elbe the kingdom of Westphalia was formed and bestowed on Jerome, Napoleon's youngest brother; and Russia obtained a part of Prussian Poland, and by secret articles was allowed to take Finland from Sweden. Soon after the Peace of Tilsit was signed Napoleon entered into a war against Portugal, as that nation had refused to respect the Berlin decree, and Junot was sent to occupy Lisbon (30 Nov. 1807). The Pope refusing to carry out the continental blockade and to recognize Joseph Bonaparte as king of Naples, Rome was occupied 2 Feb. 1808. The administrative affairs of Spain having fallen into inextricable confusion, Napoleon sent into that kingdom an army under Murat, who with difficulty took possession of the capital and by the treaty of Bayonne Charles IV. resigned the Spanish crown, which was given to Joseph Bonaparte, Murat receiving the vacant sovereignty of Naples.

The great body of the Spanish people rose against this summary disposal of the national crown, and England assisted them with immense supplies. Thus began the Peninsular war (q.v.), which lasted seven years. The Spaniards were at first successful; a French squadron was captured by the English at Cadiz, 14 June; Gen. Dupont surrendered at Baylen, 22 July, with 18,000 men; Junot was defeated 21 August by Sir Arthur Wellesley at Vimeira. But Napoleon rushed to the scene of action in October at the head of 180,000 men, and entered Madrid in spite of all resistance by the Spaniards, 2 December. The British troops which had advanced to the aid of the Spaniards were driven back on Coruña, where they made a successful stand, but lost their general, Sir John Moore, 16 Jan. 1809. In the meantime Austria, alarmed at the aggressive policy of Napoleon, who had seized Tuscany and the States of the Church, and determined to profit by his absence in Spain, again declared war, and got together an effective army under the Archduke Charles. Napoleon hurried into Bavaria, encountered the archduke at Eckmühl (22 April), and completely defeated him; on 13 May he again entered Vienna. Reorganizing his shattered army, Charles likewise advanced toward Vienna on the opposite bank of the Danube. The French seized the island of Lobau, threw a bridge across the river, and attacked the enemy at Aspern and Essling on the 21st and 22d, but were repulsed and thrown back on the island, which they proceeded to fortify, awaiting the arrival of Eugène with the army of Italy. On 5 July they debouched on the left bank of the Danube, and on the 6th the Austrians were crushed at Wagram. This enabled Napoleon to dictate his own terms of peace, which were agreed to on 14 October at Schönbrunn. On the preceding day an unsuccessful attempt was made to assassinate him by a young German enthusiast named Staaps. Whether the subsequent marriage with the daughter of the Austrian emperor was in course of negotiation at Schönbrunn is doubtful, but soon after his return to Paris Napoleon informed Josephine of his determination to divorce her. He seems to have arrived at the conclusion that he could only put an end to the machinations of the old legitimate dynasties by intermarriage. Josephine, too, had borne him no children, and he was ambitious of perpetuating his power in his family. On 16 December an act of divorce was passed by the commissioners of the senate, and by proxy 11 March (formally 2 April) 1810 he was married to the Archduchess Maria Louisa. The fruit of this union was a son, Napoleon François Charles Joseph, born 20 March 1811, and proclaimed in his cradle king of Rome. (See REICHSTADT, DUKE OF.)

The years 1810–11 were the period of Napoleon's greatest power. On the north he had annexed Holland, Friesland, Oldenburg, Bremen, and all the coast-line as far as Hamburg, and on the south Rome and the southern papal provinces. His empire thus extended from the frontiers of Denmark to those of Naples, with Paris, Rome, and Amsterdam as its first, second, and third capitals, and it was divided into 130 provinces, having a total population of 42,000,000. He may also be said to have exercised almost unlimited control in Spain, the Italian kingdoms, Switzerland, and the Confederation of the Rhine (q.v.). But now the tide began to turn. Russia found it impossible to carry out the continental blockade without permanent injury to her great landowners; Sweden, which had accepted Bernadotte, one of Napoleon's generals, as king, was in a like predicament. The Berlin decree was frequently evaded, which involved Russia particularly in fresh complications, and in view of the war now inevitable, that nation formed an alliance with Sweden. In May 1812 Napoleon declared war against Russia, and determined, in spite of the dissuasion of his most prudent generals, to invade the country. On 16 May Napoleon was in Dresden making arrangements for the great Russian campaign. The army he organized for it has been estimated at from 640,000 to 680,000 men, inclusive of Prussian, Austrian, German, Polish, and Swiss auxiliaries. An army of 300,000 Russians, under Barclay de Tolly and Bagration, assembled on the banks of the Niemen to oppose him. On 24 June he crossed that river at Kovno, and the Russians retired step by step before him, deliberately wasting the country, carrying off all supplies, and avoiding as far as possible general engagements. The French, however, pushed rapidly forward, overtook and routed the rear guard of Barclay's army at Ostrovno, 25 July, and on the 28th occupied Vitebsk. On 16 August the Russians made a stand at Smolensk against an advanced division of the French army, and when the latter entered the city on the 18th it was in ruins.

Both the opposing armies now took up their march toward Moscow. Kutusoff, who had succeeded Barclay, resolved to dispute the passage of the Borodino. An obstinate battle ensued 7 September, which cost the French nearly 30,000 men, and their opponents about double that number. On the 15th Napoleon entered Moscow, which had been deserted by its inhabitants, and which was nearly destroyed by a fire that began on the same night and lasted five days. The baffled French were compelled to seek shelter in the desolate surrounding country. Napoleon vainly attempted to negotiate with Alexander; it was impossible to pursue the Russians farther; nothing remained but retreat. The French army was now reduced below 120,000 men. For some time the weather was favorable, but the winter set in earlier than usual, and with extraordinary severity.

The line of retreat, too, led through the very districts which had been wasted on the advance. Swarms of mounted Cossacks incessantly harassed the French, now sadly demoralized by cold, famine, disease, and fatigue. When the invaders left Smolensk (14 November) they numbered only 40,000 fighting men, and when they had fought their way over the Berezina (27th) there remained but 25,000. At Smorgoni Napoleon quitted the army (5 December), leaving Murat in command.

Napoleon reached his capital on the 18th and immediately ordered a fresh conscription, still determined on prosecuting the war. But the spirit of Europe was now fairly roused; kings, ecclesiastics, and people rose unanimously against the devastator of the Continent, the terror of whose name had been destroyed by his disastrous reverse. A sixth coalition, consisting of Prussia, Russia, England, Sweden, and Spain was formed, which early in 1813 sent its forces toward the Elbe. Napoleon had still an army of 350,000 in Germany. For some months he was everywhere victorious. On 2 May he defeated the allies at Lützen, and on the 21st at Bautzen. He reached Breslau 1 June, and on the 4th concluded a six weeks' armistice, which gave the allies time to reorganize and concentrate their forces and, what was of equal consequence, to gain over Austria. The campaign was reopened 16 August. The allies advanced on Dresden, where Napoleon had his headquarters. The battle which ensued (see DRESDEN, BATTLE OF) 26-7 August was another dearly bought victory for the French, who were now so outnumbered that their chief was compelled to fall back on Leipsic. There he was completely hemmed in, and in the great "Battle of the Nations" (Völkerschlacht), as this battle of Leipsic is called, fought 16–19 October, he was completely defeated. The retreat across the Rhine was almost as disastrous as that from Moscow.

On Napoleon's arrival at Paris, 9 November, he succeeded in obtaining from the senate, in spite of the opposition in the legislative body and the prevalent discontent of the people, a decree for a conscription of 300,000 men. With a fertility of resource and a genius for combination almost miraculous, he was able to enter on another campaign, which was this time to be conducted in France. From January to March he confronted the combined hosts of the allies, inflicting defeat after defeat on them. But numbers were against him; a new and formidable enemy, Wellington, was rapidly advancing on the capital from the south. On 30 March the allies, after a severe engagement, captured the fortifications of Paris, and on the 31st Alexander and Wellington entered the city amid the acclamations of the people.

On 6 April Napoleon abdicated at Fontainebleau in favor of his son. He was allowed the sovereignty of the island of Elba, with the title of emperor, and a revenue of 6,000,000 francs. After bidding his army adieu he departed for his new abode, landing from the British frigate, Undaunted at Ferrajo 4 May, and Louis XVIII. was restored. After a residence of ten months, most of which was spent in intriguing with the Republicans and his own adherents, he made his escape from the island, and landed at Fréjus 1 March 1815, with an escort of 1,000 of his old guard. As soon as his arrival was known Ney and a large part of the army joined him, and he made a triumphal march on Paris, which he reached on the 20th. Louis was driven from his throne without a shot having been fired. The allies were startled at the astounding event. Their armies once more marched toward the French frontier. Napoleon, hastily reorganizing the government on a rather more liberal basis than that of the empire, and having made vain attempts to open negotiations for peace, advanced to meet them. On 15 June he crossed the Sambre at the head of 130,000 men to attack the

English and Prussians under Wellington and Blücher. On the 16th he defeated Blücher at Ligny, while at Quatre-Bras the English were held in check by Ney. The Prussians made an orderly and leisurely retreat, pursued by a division of the French army under Grouchy.

In order to preserve his communication with the Prussians, Wellington fell back upon Waterloo, where he was attacked by Napoleon on the 18th. The British held their ground obstinately during the greater part of the day, and in the evening, when Blücher, who had outmaneuvered Grouchy, came up, the French were completely crushed, and Napoleon's power forever broken. The retreat was a disorderly flight. The allies marched without opposition on Paris. On the 22d Napoleon again abdicated in favor of his son; but being threatened by Fouché, who had assumed the direction of the government, and seeing no hope of escape from France, he surrendered at Rochefort to Captain Maitland of the British warship Bellerophon, claiming the hospitality and protection of the British government. Captain Maitland was instructed to detain him as a prisoner, and then transfer him to the Northumberland, which was to convey him to the island of St. Helena, where he was to be confined for the rest of his life, according to a convention signed at Paris 20 August, between Great Britain, Austria, Russia, and Prussia. He landed there 16 October. In July 1816 Sir Hudson Lowe was sent out as governor of the island. From the very first Napoleon seems to have quarreled with that officer, and he appealed to the sympathy of the world through reports of the ill treatment he was subjected to. The governor had no power to remedy the chief causes of the prisoner's complaint. In September 1818 Napoleon's health began to fail. He refused medicine, would not ride, toward the end of 1820 grew worse, and died at last of cancer of the stomach. On 8 May 1821 he was buried on the island; but in 1840, in accordance with his own wishes, his remains were removed to Paris, and there, under the dome of the Hôtel des Invalides, they found their final resting-place. Consult: Thiers, 'History of the French Revolution' (1823–7) and 'History of the Consulate and Empire' (1845–61); Scott, 'Life of Napoleon' (1827); Bignon, 'Histoire de France sous Napoléon' (1829–50); Thibaudeau, 'Le Consulat et l'Empire' (1834–5); Lanfrey, 'History of Napoleon' (1869–75); Jung, 'Bonaparte et son Temps' (1880–1); Ropes, 'The First Napoleon' (1885) and 'Campaign of Waterloo' (1893); Fournier, 'Napoleon I., eine Biographie' (1886–9); Sargent, 'Napoleon Bonaparte's First Campaign' (1894) and 'Campaign of Marengo' (1897). For the relations of Napoleon with the United States, Adams' 'History of the United States 1801–17' (1889–91) should be consulted. The 'Correspondance de l'Empereur Napoléon I.' (1858–70) is a main source of original documentary history. Of works of a more personal character, dealing with the life of Napoleon from various points of view, among the more important are those of Bourrienne, Talleyrand, Metternich, Rémusat, Marbot, Montholon, Pasquier, Ségur, Las Casas, O'Meara, Sachet, Masséna, Marmont, and Roederer. As recent writings of another sort bearing on Napoleon's personal history, those of Levy and Masson deserve particular notice. The work of Rose, 'Life of Napoleon I.' (1901) is the latest complete biography in English. Channing's essay on Napoleon, and Emerson's chapter in 'Representative Men,' as well as Carlyle's pictures in 'Heroes,' are still worthy of attention.

Napoleon II., son of Napoleon I. See REICHSTADT, DUKE OF.

Napoleon III. (CHARLES LOUIS NAPOLEON BONAPARTE), emperor of the French: b. Paris 20 April 1808; d. Chiselhurst, England, 9 Jan. 1873. He was the son of Louis Bonaparte (q.v.), king of Holland. He was taken by his mother, Queen Hortense, to Switzerland in 1816, was educated at the gymnasium of Augsburg and the military school at Thun, joined the unsuccessful Italian revolt against papal rule in Romagna, and by a conspiracy at Strasburg on 30 Oct. 1836 was declared emperor. He was arrested and sent without trial to the United States, returned to Switzerland in 1837, lived in London in 1838–40, and on 6 Aug. 1840 landed at Boulogne for a fresh attempt against Louis Philippe. This time he was imprisoned in the fortress of Ham, under a life sentence; but he contrived his escape 25 May 1846. During this time he had leisure for the exercise of his literary abilities, and the result was the works: 'Aux Mânes de l'Empereur'; 'Fragments Historiques'; 'Analyse de la Question des Sucres'; 'Réponse à M. de Lamartine'; 'Extinction du Paupérisme'; besides contributions to the 'Dictionnaire de la Conversation,' and several articles to democratic newspapers. On the outbreak of the revolution of 1848 he hastened from England to Paris, and in a letter to the provisional government declared that he came to serve under the republican flag (28 Feb. 1848). On the day following he issued another letter announcing that as the government deemed his presence in Paris dangerous he would immediately quit the country. He accordingly returned to London, where he served as a special constable on the occasion of the great Chartist demonstration of April (1848). In the election of September he was put forward by Paris and three other departments. He returned to Paris and on 26 September took his seat.

He at once commenced through his zealous associates his candidature for the presidency. On the day of the election, 10 December, it was found that out of 7,500,000 votes Louis Napoleon had obtained 5,434,226. On the 20th the prince-president, as he was now called, took the oath of allegiance to the republic. For a time the greatest harmony seemed to be re-established; the president selected his ministers from the ranks of the various political parties, and strove to gain a majority in the assembly by the adoption of a strictly conservative policy. On 2 Dec. 1849 was formed a new ministry, the members of which were merely tools of the president. It was evident that a crisis was approaching. At last on 2 Dec. 1851 it came. Paris was overawed by the army; there was needless butchery in the streets; reports of approval by Paris of this course were sent to the provinces. The empire was re-established in Louis Napoleon by a vote of 8,000,000 to 640,000. On 29 Jan. 1853 the new sovereign married Eugénie Marie de Montijo, Countess de Teba. In 1854, Napoleon, in conjunction with England, entered the Crimean war in the interest of Turkey against Russia — a war which was carried on by all the parties with great vigor, until a peace was concluded, 30 March 1856, the terms of which were the neutralization of the Black Sea, the abandonment by Russia of her protectorate of the Danubian principalities, and a re-arrangement of frontier territory between Russia and Turkey, to the advantage of the latter power. (See CRIMEA, *History.*) About the beginning of the year 1859 it was evident that another European war was imminent. Northern Italy was groaning under the Austrian yoke; Sardinia demanded a separate government for Lombardy and Venetia, which Austria refused to grant. War was declared between that country and Sardinia about the end of April, and Napoleon took up arms in favor of his Italian ally, Victor Emmanuel. The two allied sovereigns took the field in person. Montebello, Magenta, Marignano, and Solferino were brilliant victories for the allies. By the terms of the Peace of Villafranca, Austria ceded Lombardy to Italy, and the provinces of Savoy and Nice were given to France.

A second distant expedition was undertaken, but had not a like success. Toward the end of 1861 France, England, and Spain agreed to despatch a joint expedition to Mexico for the purpose of exacting redress of injuries of long continuance inflicted on the subjects of the respective allies, and the enforcement of pecuniary claims, which were obstinately contested by the Mexican government. The extravagant demands of M. de Soligny induced the English and Spaniards to believe that Napoleon had some ulterior object in view, and they withdrew from further intervention (April 1862). The French army continued the quarrel alone. On 10 June General Bazaine led his troops into the Mexican capital amid many demonstrations of enthusiasm. An imperial form of government was initiated, and Maximilian (q.v.), archduke of Austria, was placed at its head with the title of emperor. Maximilian's death caused Napoleon's policy to be viewed with suspicion in France. The emperor opened the Suez Canal, entertained Europe at the World's Exposition, rebuilt and greatly beautified Paris. But France lost slowly in prestige, and there was a decline of administrative integrity.

On the conclusion of the Austro-Prussian war of 1866 Napoleon, jealous of the growing power of Prussia, demanded a reconstruction of frontier, claiming, by way of compensation for his non-intervention in the quarrel, Prussian territory on the Saar, a claim peremptorily refused. The ill-feeling between the two nations was increased in 1867, when the king of Holland signified his intention to cede Luxemburg to France. The cession was strongly resisted by Prussia, and at the London conference (7–11 May) the neutralization of the duchy was agreed to by treaty under the guarantee of the Great Powers. It could no longer be concealed, however, that a rupture between France and Prussia was imminent, and in 1870, on the Spanish crown being offered to Leopold of Hohenzollern, Napoleon demanded that the king of Prussia should compel that prince to refuse it. Notwithstanding the subsequent renunciation of the crown by Leopold war was declared by France (19 July). (See FRANCO-GERMAN WAR.) On the 28th Napoleon set out to take the chief command. After Sedan, he had a personal interview with King William, who assigned to him Wilhelmshöhe, near Cassel, as a place of residence during his captivity. One of the immediate consequences of this disaster was a revolution in Paris. Gambetta, Jules Favre, and several other members of the Corps Législatif, proclaimed a republic and the dethronement of the emperor (4 September). The empress and her son secretly quitted Paris and repaired to England, where they took up their residence at Camden House, Chiselhurst. Here they were rejoined by the emperor, when he regained his freedom in March 1871, and here he remained till his death.

Napoleon III. was rather a student and littérateur than a statesman. He was not an efficient administrator, and was most unfortunate in his advisers and subordinates. At the time of the Franco-German war he appears to have been quite deceived as to the military strength of France and its readiness for the conflict. Besides the literary works already mentioned, Napoleon III. is the author of an uncompleted 'History of Julius Cæsar' (1865–6), and various productions collected and published in 1854–69 and 1873. Consult: Gottschalk (1871); von Sybel (1873); and Jerrold (1877) for biography; also Hugo, 'Histoire d'un Crime' (1877), and various standard histories of modern Europe.

Napoleon, Eugène Louis Jean Joseph, ē-zhän loo-ē zhŏn zhō-zĕf, Prince Imperial of France: b. in the Tuileries, Paris, France, 16 March 1856; d. South Africa 1 June 1879. He fought for the Imperial arms in the Franco-German war of 1870–1; but when disaster seemed imminent was sent to join his mother in England, whither she had fled. He was proclaimed Napoleon IV. by his adherents in 1874. In 1879 he joined a British expedition against the Zulus in South Africa and was killed in ambush.

Napoleon, Joseph Charles Paul, PRINCE, a son of Jerome Bonaparte. See BONAPARTE, JEROME.

Napoleon, Ohio, village, county-seat of Henry County; on the Maumee River and the Miami & Erie Canal, and on the Lima Northern and the Wabash & Detroit R.R.'s; about 38 miles southwest of Toledo. Its chief manufactures are flour and dairy products. It has considerable trade in farm and dairy products and live-stock. The village owns and operates the electric-light plant and the waterworks. Pop. (1910) 4,007.

Napoleon, a piece of French money valued at $4 or 20 francs. See LOUIS D'OR.

Napoleon Gun. See ARTILLERY.

Napoleon le Petit, lė pė-tē («Napoleon the Little»), the title of Victor Hugo's savage satire on Louis Napoleon (Brussels, 1852).

Napoleon's Tomb, the burial-place of Napoleon Bonaparte under the dome of the Invalides in Paris. It has the form of a circular crypt 20 feet deep and 36 in diameter, open at the top. The tomb was designed by Visconti, and on the walls are 10 marble reliefs by Simart. Napoleon's remains were brought here in 1840 from Saint Helena.

Naquatez (nä'kwā-tĕz) **Indians.** See CREEKS.

Naquinoneis, nā-kwē-nō'nēz. See Chiquitos.

Nara, nä'rä, Japan, the capital of a prefecture, and from 709–784 the capital of the country, on the island of Hondo, 26 miles by rail southeast of Osaka. It has some manufactures of toys, fans, art objects, etc., but its chief interest is archæological and historical, illustrated in the Shoso-in Museum with its splendid collection of antiquities, and in the shrines and temples dating from the imperial period, one of which contains a celebrated Daibutsu (q.v.), or gigantic statue of Buddha. Pop. about 35,000.

Nar'aka, or Nuruk, in Hindu mythology, a term equivalent to the English word hell. In Naraka there are 28 divisions, in which sinners of as many different classes are confined and subjected to tortures corresponding to the gravity of their offenses.

Narbada, när-bä'dä. See Nerbudda.

Narbonne, när-bŏn, France, the chief town of an arrondissement in the department of Aude, in a beautiful hill-girt plain, eight miles from the Mediterranean and 36 miles by rail east of Carcassonne. Boulevards occupy the site of the mediæval ramparts removed since 1865. The town, traversed by the Robine Canal, has dark and winding streets lined with ill-built houses, and is generally unattractive. It is, however, of historical interest as the Roman Narbo Martius, their earliest colony (118 B.C.) beyond the Alps. It flourished under Tiberius, its schools for a long time rivaling those of Rome. About 309 A.D. it became the capital of Gallia Narbonensis, and had its capitol, forum, theatre, aqueducts, triumphal arches, etc., of which there are few remains owing to the vandalism of Francis I. in using them as building materials. In 412 it was taken by the Visigoths, in 719 by the Saracens, from whom it was recovered by Pepin in 759, to fall a century later to the Northmen. During the 11th and 12th centuries it was a prosperous manufacturing city, but subsequently deteriorated owing to the silting of its harbor. The principal edifices are the Romanesque church of St. Paul (1229); the quondam cathedral of St. Just (1272–1332), only the fine Gothic choir of which, 131 feet high, has been completed; and the former archbishop's palace, now the city hall, in which are a good museum, a library, and a picture gallery. The white heather honey of Narbonne maintains its ancient celebrity; the wine is chiefly used for blending purposes, its production being now carefully supervised by the œnological station founded in 1894.

Narcissus, när-sĭs'ŭs, in Greek mythology, the son of the river god Cephissus. Narcissus was of surpassing beauty, but excessively vain and inaccessible to the feeling of love. Echo pined away to a mere voice because her love for him found no return. Nemesis determined to punish him for his coldness of heart, and caused him to drink at a certain fountain, wherein he saw his own image, and was seized with a passion for himself of which he pined away. The gods transformed him into the flower which still bears his name. See Echo; Mythology.

Narcissus, a genus of plants of the order *Amaryllidaceæ* (q.v.). The species, numbering from 16 to about 50, according to different authors, have bulbous roots, narrow grass-like leaves, and generally white or yellow flowers borne singly or in small clusters and protruding from a dry spathe at the summit of a leafless scape. Because of their hardiness, ease of cultivation, habit of blooming in early spring, beauty and fragrance, many of the species and their numerous hybrids and varieties have been general garden favorites for centuries. A few produce their blossoms in the autumn (for example, *N. serotinus*, *N. elegans*, and *N. viridiflorus*); but they are rarely cultivated. Some are useful for winter forcing, especially the polyanthus narcissus (*N. tazetta*), with its popular forms the "paper white" and the "Chinese sacred lily." In general, the garden species succeed best in well drained garden soil of medium texture and richness. The bulbs should be planted in autumn about five inches deep and three inches apart, and should not be disturbed until they appear to be failing, perhaps after three years. Then when the foliage has died down the clumps may be dug, the bulbs divided, cleaned, and stored in a cool dry place until planting time. Among the most popular species are the poet's narcissus (*N. poeticus*), also known as pheasant's eye, the jonquil (*N. jonquilla*), and *N. tazetta* mentioned above. The Lent lily (*N. pseudo-narcissus*), or daffodil, is also one of the most widespread and hardy. See Daffodil.

Narco'sis, or Narcotism (Greek, "stupor"), insensibility more or less profound, the result of absorption by the blood, and subsequent action on the brain, of certain drugs in poisonous amount, or of certain excretory elements, as in uræmia.

Narcot'ics (from Greek ναρκοῦν, to benumb), substances which have the property of stupefying. In small (medicinal) doses they either quiet undue irritability of the nervous system, producing sleep and relieving pain or spasm, or they excite or stimulate the normal irritability. Opium and alcohol, for example, are sometimes used as "bracers." Narcotics are too frequently used for slight ailments or fancied ones. For the repeated or habitual use of small doses is dangerous, as it is apt to excite a craving for and the use of larger or poisonous doses (see Poisons). Poisonous doses produce stupor, coma, and sometimes convulsions and death. Those narcotics which produce sleep are termed hypnotics (q.v.) or soporifics. Those which are used to alleviate pain are anodynes or analgesics (q.v.). Though the effects of most of the narcotics resemble more or less those of opium each narcotic affects the system in a peculiar way. Belladonna, for example, dries the throat, dims the vision, dilates the pupils of the eyes (opium contracts them), and produces delirium. Some narcotics produce constipation, others do not. Some act principally upon the brain, others on the alimentary canal or bronchial tubes. The principal narcotics are opium (with its alkaloids, such as morphia, codeine, and thebaia, and preparations of it — paregoric, laudanum, etc.), belladonna, camphor, hyoscyamus or henbane, caffeine, chloral hydrate, alcohol, Indian hemp, hops, bromide of potassium, and stramonium. There is also a group of chemical organic compounds which are narcotics, such as paraldehyde, sulphonal, and trional. Nar-

NARCISSUS.

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cotics should be used with extreme caution, as the susceptibility to their poisonous effects varies in different persons. Of late years the market has been flooded with so-called pain-cures, carminatives, cordials, soothing-syrups, etc., warranted to be harmless, but which are in fact narcotics, in mixtures more or less agreeable to the taste, but none the less liable to do harm. Children are more susceptible to the influence of narcotics than adults, hence the risk of giving them to children is greater. See Anæsthetics: Nicotine: Tobacco.

Nar'cotine, an alkaloid which occurs in opium, has the chemical formula $C_{22}H_{23}NO_7$, and acts as a narcotic poison. It may be prepared as follows: Opium is exhausted with dilute hydrochloric acid, and the alkaloidal bases that the extract contains are precipitated by the addition of caustic potash. The precipitated bases are then re-dissolved, and the solution is treated with oxalic acid to precipitate the papaverine that it contains, after which the filtered solution is treated with ammonia to throw down the narcotine. The precipitate so obatined is purified by re-crystallization from alcohol. Narcotine was the first alkaloid obtained from opium, of which it constitutes from 1 to 8 per cent by weight. It is almost insoluble in cold water, moderately soluble in alcohol and in ether, and readily soluble in chloroform. It crystallizes in trimetric prisms, or in radiating needle-like forms, which melt at 349° F. Aqueous solutions of the alkaloid are neutral, and solutions in other menstrua are but feebly alkaline. Narcotine (unlike the other alkaloids that opium contains) appears to exist in opium in the free state, and not in the form of a salt. Its salts do not crystallize readily, and are decomposed when their solutions are evaporated, with separation of free narcotine.

Nard, a plant, spikenard. See Aralia.

Nares, närz, Sir **George Strong,** English Arctic explorer: b. Danestown, near Aberdeen, Scotland, 1831. He was educated at the Royal Naval College and entered the navy in 1845. He accompanied the Arctic expedition of 1852–4 and in 1872–4 commanded the Challenger. In 1875–6 he was at the head of the North Polar Expedition and obtained valuable scientific information, after which he was assigned to the command of a survey of the South Pacific. He was created vice-admiral in 1892, but has retired from active service. He wrote: 'Seamanship' (1862); 'Voyage to the Polar Sea' (1878); etc.

Narghile, när'gĭ-lĕ, or **Nargileh,** a Turkish tobacco-pipe, the chief feature of which is that when used the smoke is made to pass through water. It is otherwise called a hookah, and is commonly known as a water-pipe.

Nariño, nä-rē'ño, **Antonio,** Colombian politician: b. Bogota, Colombia, 1765; d. Leiva, Colombia, 13 Dec. 1823. He was educated in the college of San Bartolome in Bogota and entered the magistracy. His writings of a revolutionary character brought him into trouble and in 1795 after a tedious trial he was transported to Spain under sentence of ten years' penal servitude. Escaping in 1797 he returned to his own country but was again imprisoned and not released until the revolution of 1810, when he joined the patriot army. He was elected president in 1811 and later dictator. Civil war breaking out Nariño defeated the federalists and then resigning his dictatorship marched against the royalist forces in the south. His success was followed by defeat at Pasto in 1814 when he was captured and sent a prisoner to Spain. He was held a prisoner until 1820 when he returned to his own country. In 1821 he was elected senator, but declined the vice-presidency in 1822 and ill health compelled him to retire soon after his appointment as commander-in-chief in 1823.

Narragansett (năr-ạ-găn'sĕt) **Indians,** an American tribe formerly occupying the territory now comprised in the State of Rhode Island and the eastern part of Long Island. Shortly after the arrival of the pilgrims they manifested symptoms of hostility; and as an expression of sentiment Canonicus, their chief, sent to Plymouth a bundle of arrows wrapped in the skin of a rattlesnake; to which Bradford, the governor, replied with the same skin filled with powder and shot. This significant retort secured, if not the good-will, at least the peaceableness of the sagacious chief. In the Pequot war they aided the colonists, but not unanimously. In the winter of 1675, during King Philip's war, that chief having taken refuge with the tribe, the colonists, apprehending that they would join his cause, made a secret attack upon their principal fort, killing about 1,000 warriors, destroying all their provisions, and exposing those who escaped to cold and famine, of which very many died. The Narragansetts from this time waged incessant war with the whites. They have now entirely disappeared as a race, although some of their descendants of mixed blood are to be found in one or two localities in Rhode Island.

Narragan'sett Bay, an inlet of the Atlantic Ocean, extending into the State of Rhode Island about 28 miles. At its entrance, from Sakonnet Point to Point Judith, the bay is about 18 miles wide. One of its channels, on the east, is called Sakonnet River, and the chief arms of the bay are on the east Mount Hope Bay, on the west, Greenwich Bay. The principal rivers which enter the bay are, at its head, Providence River, from the east Taunton, from the west Pawtuxet. The largest island in the bay is Rhode Island, and others are Conanicut, Prudence, and Hog. Several places of importance are on the shores of the bay, chief of which are Providence at the mouth of the Providence River, Newport on Rhode Island, and Fall River, at the mouth of the Taunton.

Narragansett Bay is of great importance to the State, as it gives a longer shore-line and more opportunities for commerce and transportation. The first explorers of the northeast coast of the United States mention this bay.

Narragansett Pier, R. I., a famous summer resort, in Washington County; on Narragansett Bay, and on the Narragansett Pier Railroad; about 10 miles from Newport and 28 miles from Providence. The railroad was built in 1876 and extends from Kingston Station to the «The Pier,» a distance of about 12 miles. A steamer plies daily during the season between Newport and «The Pier.» The chief attractions are the climate and the scenery. Narragansett Heights, about three miles distant, are about 400 feet above sea-level. The colored rocks nearby and the long beach are attractive. There are a number of fine hotels, handsome cottages, and excellent bathing houses and pavilions. The place was settled in 1675, and the same year an engagement took place nearby between the colonists and the Narragansett Indians. Gen. Winslow, who commanded the colonists, about 1,000 in all, captured 600 Indians and killed 300. The loss of the whites was about 150 wounded and 85 killed. The pier, from which the place takes its name, was built in 1815. Pop. of town (1910) 1,250.

Narrenschiff, när'ĕn-shĭf, **Das** («The Ship of Fools»), Sebastian Brant's celebrated work (1494). See BRANT, SEBASTIAN.

Narrows, The, a narrow part of New York Bay, a channel which connects Upper New York Bay with Lower New York Bay, and separates Long Island and Staten Island. At the south entrance of The Narrows are two forts, Fort Hamilton on Long Island and Fort Wadsworth on Staten Island. See NEW YORK BAY.

Narses, när'sēz, Byzantine general: b. Armenia 472; d. Rome 568. He was a slave and a eunuch, when he entered the imperial household in Constantinople, of which he soon became chamberlain. His ability soon advanced him to the office of treasurer to Justinian, who sent him to Italy in 538 to keep an eye on Belisarius. In 551 Narses became commander-in-chief in Italy, speedily drove thence the Franks and Goths, re-established Byzantine control, but in spite of his able administration was removed by Justinian's successor, Justin II. Legend says that he was insulted by the Empress Sophia upon his dismissal, and that he thereupon went over to the Lombards. He was equally famous as general and statesman. Consult: Hodgkin, 'Italy and Her Invaders' (1885–95, Vols. IV. and V.); Bury, 'Later Roman Empire' (Vol. I., 1889).

Nar'thex (Greek, a reed, hence any oblong figure), the term used in ecclesiastical architecture to designate the westernmost division of an ancient Greek Church, running like a cloister from the north to the south wall. It was separated from the nave proper by a screen or railing, beyond which catechumens and those under Church censure or penance were not permitted to advance. It had three door-ways, one on the west as well as one in the northern and southern walls. The western was the principal entrance and was known as «the beautiful» or «royal gate.» The doors leading through the screen into the nave were named according to the classes who used them, «the priests' gate,» «the men's gate,» etc. The narthex was also used for funerals and public meetings; baptism was celebrated there and the font, which had formerly been in a building adjoining the church, was also placed in the narthex. Consult: Bingham, 'Christian Antiquities'; Siegel, 'Christliche Alterthümer'; Walcott, 'Sacred Archæology.'

Naruszewicz, nä-roo-shä'vĭch, **Adam Stanislaw,** Polish historian and poet: b. Pinsk, Lithuania, 20 Oct. 1733; d. Janow, Galicia, 8 July 1796. He became a Jesuit in 1748: taught in the Jesuit schools in Wilna and Warsaw; and after the suppression of the Order became bishop of Smolensk, and later of Lutsk. His poetry, consisting of translations, odes, fables, epigrams, satires, and idylls, was published in 1778. In prose, he translated Tacitus, wrote a biography of Chodkiewicz (1781), composed a history of Crimea (1787), and on the suggestion of his patron, King Stanislaus Augustus Poniatowski, wrote his greatest work, a history of Poland down to 1386 (1780–6), which, because of its style and its protest against the abuses of a monarchy or an aristocracy, won him the name of the Polish Tacitus.

Narvacan, när-vä-kän', a pueblo of the province of Ilocos Sur, Luzon, situated 13 miles southeast of Vigan, the provincial capital. It is on the main road and one of the most important towns of the province, being next the capital in population. Pop. 16,500.

Narvaez, när-vä-ĕth', **Pánfilo de,** Spanish soldier in America: b. Valladolid about 1470; d. near mouth of Mississippi River November 1528. He came to America about 1498, settled first in Santo Domingo and then in Cuba, where from 1512 until his death he was under Velasquez in the command of an auxiliary force in the conquest of the island. The disobedience of Cortés in Mexico, whither he had been sent by Velasquez led the latter to send Narvaez in 1520 to supersede and punish Cortés. This expedition was entirely unsuccessful. Narvaez landed at Vera Cruz in April; was defeated in May at Cempoala by the army of Cortés; lost one eye in the battle; and was deserted by the remnant of his army, which joined Cortés. He was captured, but soon released; returned to Spain, where he was appointed governor of Florida in 1526; and sailing from Cuba in March of 1528, landed at Apalachee Bay, lost half his men on the march inland, retreated to the shore, where he found that his ships had been destroyed, and having built boats, sailed westward along the coast, only to be shipwrecked with all but four of his men.

Narvaez, Ramon María, DUKE OF VALENCIA, Spanish general and statesman: b. Loja, Andalusia, 4 Aug. 1800; d. Madrid 23 April 1868. He entered the army in 1815; lived in retirement from 1823 to 1834; in 1836 defeated the Carlist leader, Gomez; and in 1838, after clearing La Mancha of brigands, was made captain-general of Old Castile. He led an insurrection against Espartero, his old chief, but was beaten and fled to France, where he joined the party of Maria Christina. He returned to Madrid in July 1843; Espartero left the country; and from May 1844 to February 1846, and from October 1847 to January 1851 Narvaez was prime minister, in recognition of his services to Maria Christina. He held the same post in 1856–7 and 1864–5, being minister to Paris and Vienna in the intervals. During the military rising of 22 June 1866 Narvaez commanded the loyal soldiery, and in July succeeded the defeated O'Donnell as ministry president and minister of war. A liberal in early life he became more and more conservative and spent his last years in attempting to keep Isabella on the throne.

Nar'whal, a large porpoise which inhabits the Arctic Ocean. It belongs to the family *Delphinidæ* and was named *Monodon monoceros* by Linnæus. Its most striking characteristic is the possession of a very long, straight, spirally-grooved tusk, which projects forward from the left side of the upper jaw in line with the axis of the body. When full-grown the narwhal has a length of about 16 feet. The head is rounded, the back has a very low ridge instead of a fin, and the pectoral fins are short and broad. The color of the body is gray above, and white below, everywhere mottled and spotted with gray and black. The young are darker colored, while old individuals are often nearly white throughout. The vertebral formula is as follows: Cervicals, 7; dorsals, 11; lumbars, 6; caudals, 26; total, 50. The cervical vertebræ, unlike those of other porpoises, except the beluga or white whale, are all free. The skull is depressed, with a broad rostrum.

The massive tusk or maxillary tooth of the narwhal is developed only in the male, and with rare exceptions, only on the left side of the jaw. Normally, the corresponding tusk or tooth of the right side remains concealed in the maxillary bone during life. In females neither tusk is visible. All other teeth are wanting in adults of both sexes. Occasionally, both tusks are developed in males and in females as well. About 16 such heads have been preserved, including one from Prince Regent Inlet in the National Museum, Washington. The largest narwhal tusks are about 8 feet long, with a girth of about 9 inches at the base. They are hollow for a considerable proportion of their length.

The tusk is a secondary sexual character like the antlers of the stag, the spurs and comb of the cock, etc. It has been suggested that the narwhal makes use of the tusk to break the ice, to transfix its prey, or in combat, but these ideas lack confirmation.

When first introduced into Europe, the true origin of the tusks not being known, they were supposed to be the horns of the mythical unicorn. For a considerable time they were highly prized on account of their reputed medicinal properties, and are still made use of in China as a drug.

Narwhals occur in large herds, or schools, among the ice of the Arctic Ocean, northward of lat. 65° N. They migrate to higher latitudes as the ice recedes and return in the fall. Very rarely individuals stray southward along the coast of Europe as far as Scotland.

The narwhal resembles the beluga or white whale in many important characters, not shared by other porpoises, and forms with it a separate sub-family, the *Delphinapterinæ*.

F. W. True,
Curator U. S. National Museum.

Nasals. See Phonetics; Speech.

Nasby, năz'bĭ, **Petroleum V.** See Locke, David Ross.

Nascent State, in chemistry, the state or the peculiar reactionary power possessed by an element at the instant of liberation from a compound or combination in which it has previously existed. At the moment an element is liberated from a compound of which it has been a constituent it acquires a higher power of chemical reaction than it displays some time after its liberation. One theory of the nascent state of an element is that the molecules at the instant of liberation are separate and independent; and that an appreciable length of time is required for their final arrangement; and that while they are in this free state, they possess an extraordinary power of reaction, which power is otherwise exerted and expended in the act of molecular arrangement. For instance, it has been advanced by some chemists and physicists that hydrogen in a nascent state is made up of single atoms, while hydrogen in a gaseous state is composed of molecules, each molecule containing two atoms. Thus many substances will combine with nascent hydrogen which utterly refuse gaseous hydrogen.

Nascopi, nä-skō'pē, or **Nascapee, Indians,** a Labrador tribe, the most easterly known branch of the Algonquian family. They formerly occupied the interior table-land extending from Lake Mistassini to the Atlantic Ocean.

Nase'berry, the fruit of *Sapota achras,* one of the finest West India fruits. The bark of the tree has astringent and febrifugal properties. See Sapotaceæ.

Naseby, năz'bĭ, England, a village of Northamptonshire, 12 miles northwest of Northampton (pop. 700), near which, on 14 June 1645, Fairfax and Cromwell commanding the Parliamentary troops, defeated Charles I. and his army, taking 5,000 prisoners and capturing the royal cannon and baggage. Since 1823 the battlefield is marked by an obelisk on Naseby ridge (648 feet).

Nash, Abner, American politician: b. Prince Edward County, Va., 8 Aug. 1716; d. Philadelphia, Pa., 2 Dec. 1786. He studied law and removed to New Berne, N. C., where he practised successfully and in 1774 he was a member of the first provincial congress of North Carolina. He served as member of the council which framed the State constitution in 1776 and was speaker of the senate in 1779. He was governor of the State from 1779–81 and in 1782–6 sat in the Continental Congress.

Nash, Francis, American soldier: b. Prince Edward County, Va., 10 May 1720; d. Germantown, Pa., 7 Oct. 1777. He was a brother of Abner Nash (q.v.), and early removed to North Carolina where he was clerk of the superior court of Orange county. He served under the crown with a captain's commission but resigned and was a member of the provincial congress which met in 1775 when he was appointed lieutenant-colonel in the Continental army. In 1777 he was commissioned brigadier-general by the Continental Congress and at once joined Washington, under whom he commanded a brigade and was mortally wounded at the battle of Germantown.

Nash, George Kilbon, American politician: b. York Township, Medina County, Ohio, 14 Aug. 1842; d. 28 Oct. 1904. He was educated at the Western Reserve University and at Oberlin College, studied law and was admitted to the bar. He was editor of the ‘Ohio State Journal,’ and in 1879–82 was prosecuting attorney of Franklin County, Ohio. He established a law practice in Columbus in 1883–5. In 1900 he was elected governor of Ohio, and in 1902 he was re-elected.

Nash, Henry Sylvester, American theologian: b. Ohio 1854. He entered the Protestant Episcopal ministry in 1881, and since 1884 has been professor of the literature and interpretation of the New Testament at the Episcopal Theological School, Cambridge, Mass. He has written: ‘The Genesis of the Social Conscience’ (1896); ‘Ethics and Revelation’ (1898); ‘History of the Higher Criticism of the New Testament' (1900).

Nash, Sir John, English architect: b. London 1752; d. East Cowes Castle, Isle of Wight, 13 May 1835. He studied and practised architecture under Sir Robert Taylor; then retired from business until 1793; and upon his re-entry into the profession gained much royal and noble patronage. He laid out Regent's Park, and the street leading up to the Park, now called Regent Street; remodeled Buckingham Palace; and altered the Brighton Pavilion. He was particularly fond of single façades, of projecting colonnades, and of a plentiful use of plaster and stucco. The use of cast-iron girders was principally introduced by Nash, who patented several varieties. Personally he was an estimable man, but unpopular because of George IV.'s display of favoritism toward him.

Nash, Richard, called Beau Nash, English leader of fashion: b. Swansea, Wales, 18 Oct. 1674; d. 3 Feb. 1762. He studied at Jesus College, Oxford, was for a time in the army, but finding military discipline not to his liking, entered at the Inner Temple. In 1705 his skill in gaming took him to Bath, which in 1703 had become a much frequented watering-place. He determined to improve the provincial character of the spa, and soon became a self-appointed but arbitrary master of ceremonies. He was known as the "King of Bath" and his rule was celebrated in prose and verse. His code included the prohibition of swords within his realm, a restriction which tended toward that consideration for the public peace which was then growing in England. His vanity grew with his power; he appeared in a monstrous cream-colored beaver and invariably journeyed by post-chariot with three span of grays, footmen, and outriders. About 1758 he withdrew from a reign which seems to have been in its way skilful and judicious. Goldsmith wrote his life (1762).

Nash, or **Nashe, Thomas,** English satirist and dramatist: b. Lowestoft, Suffolk, 1567; d. 1601. He studied at Cambridge in 1586, spent some time on the Continent, and before 1588 came to London. In 1589 he published his 'Anatomie of Absurditie.' In the literary warfare carried on between the Puritans and bishops Nash took an active part in behalf of the latter. Under the pseudonym "Pasquil," he published the tracts, 'A Countercuffe Given to Martin Junior' (1589) and 'Pasquil's Apologie' (1590). In 1592 he issued his powerful satire on contemporary society, 'Pierce Pennilesse his Supplication to the Divell.' His 'Christes Teares over Jerusalem' (1593) followed in repentant mood, and he affected to dismiss satire, in which, he said, he had "prodigally conspired against good houres." His notable work of picaresque fiction, 'The Unfortunate Traveller, or the Life of Jack Wilton' (1594) to a certain extent anticipated Defoe. Involved in a paper war with Gabriel Harvey, who had boasted of having put him to silence, he thereupon published 'Have with you to Saffron-Walden, or Gabriel Harvey's Hunt is Up' (1596), brimming with scorn. Nash also wrote plays, in whole or in part. He completed, unsatisfactorily (1594) Marlowe's 'Dido.' His 'Summers' Last Will and Testament' (1593), comedy, was first published in 1600. A play 'The Isle of Dogs,' led to his imprisonment for attacks contained in it. He died having, as one epitaph put it, "never in his life paid shoemaker or tailor." Nash's personality was somewhat unique in Elizabethan literature. His prose was vigorous, and his verses were at times those of a poet. His works were edited by Grosart (1883-4).

Nashua, năsh'ū-a, N. H., city, one of the county-seats of Hillsboro County; on the Nashua River, and on several branches of the Boston & Maine railroad; about 33 miles south by east of Concord and 38 miles northwest of Boston. The first settlement was made in 1655 and in 1673 it was incorporated by Massachusetts as Dunstable township. In 1746 it was re-incorporated by Massachusetts, and in 1836 it adopted the name Nashua. It received its city charter in 1853. It is an important manufacturing city; the water power is obtained from the Nashua River by means of a canal three miles long, 60 feet wide and eight feet deep. The chief manufactures are cotton goods, paper, shoes, iron and steel products, edge tools, hardware, saddlery, refrigerators, registers, sash, doors, and blinds, ice cream freezers, stationary engines, caskets, and furniture. It has a United States fish hatchery, city and county buildings, and several fine church buildings, Saint Francis Xavier (R. C.) is the largest. There are excellent public and parish schools, and two academies. The original charter of 1853, still in use, provides for a mayor, who holds office two years, and a council. The school board is chosen by popular vote. Pop. (1890) 19,311; (1900) 23,898; (1910) 26,005.

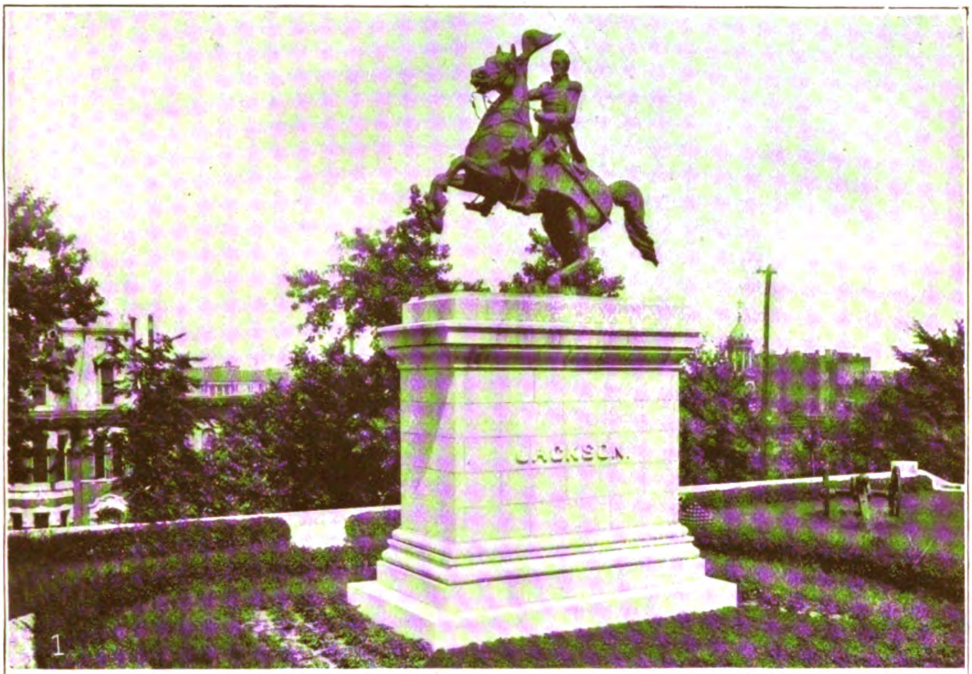
Nashville, Ill., city, county-seat of Washington County; on the Illinois S. and the Louisville & N. R.R.'s; about 110 miles south by east of Springfield. It is in an agricultural region, in which there are large coal fields. The chief manufactures are flour, dairy products, and agricultural and mining implements. Coal mining and cattle raising contribute to the industrial wealth of the city. Pop. (1890) 2,084; (1900) 2,184; (1910) 2,135.

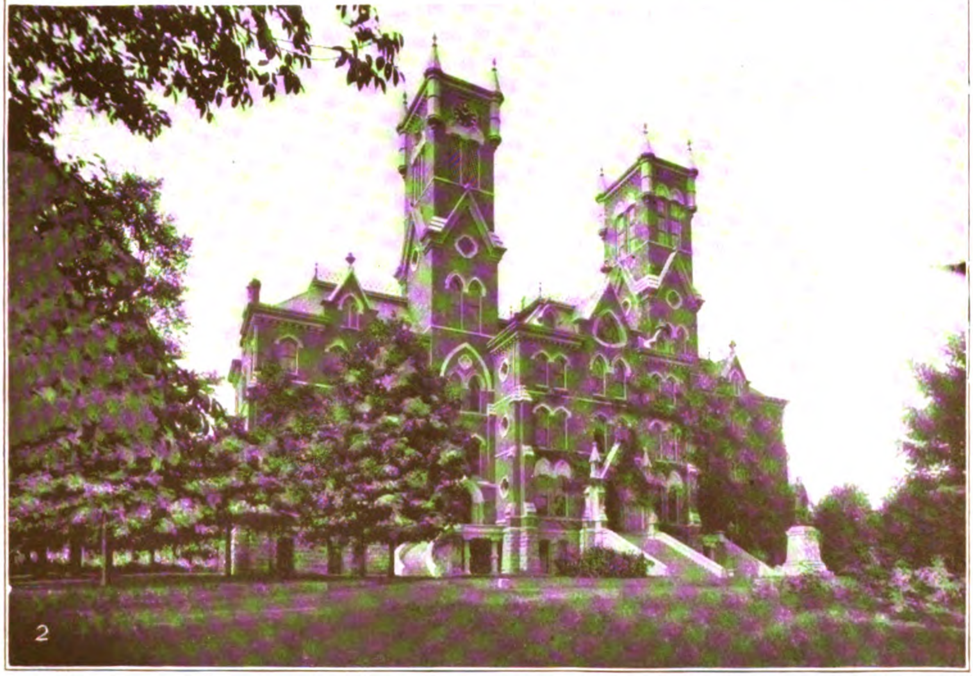
Nashville, Tenn., capital of Tennessee, the second largest city in the State, and county-seat of Davidson County; 186 miles southwest of Louisville, Ky., and 234 miles northeast of Memphis. Nashville is on the Cumberland River, and the Nashville, C. & St. L., Louisville & N. and Tennessee C. R.R.'s.

Topography.— The city has an area of about 12 square miles and is regularly laid out on gradually rising ground, sloping back from the river to an elevation of 560 feet above the sea. The streets are wide and well paved, about 175 miles of thoroughfare being covered with macadam and about 20 miles paved with granite, brick and bitulithic pavement. Around the city in every direction are the green hills of Middle Tennessee where there is much commercial timber and mineral wealth. The soil in the vicinity produces every fruit and vegetable not absolutely confined to the tropics. The average rainfall for 31 years has been 48.82 inches; the average winter temperature 39 degrees; and summer temperature 79; mean temperature for the year 59.

Government.— Nashville is governed under a charter of 1883, revised in 1901, by a mayor elected every two years, and a unicameral coun-

NASHVILLE, TENN.





1. Jackson Monument. 2. Vanderbilt University, Science Hall.

Univ. Library, UC Santa Cruz 2001

cil, which confirms the mayor's nominations of Park Commissioners, Civil Service Commissioners, Members of the Board of Health and of the Board of Education. The city attorney, comptroller, treasurer, tax assessor, city judge and board of public works are elected by the people. The city expends annually $1,000,000 for maintenance; the principal items being $200,000 for schools; $167,000 for interest on debt; $95,000 for police department and $60,000 for waterworks. The waterworks are owned by the city; the system which comprises 85 miles of mains cost over $2,000,000. The electric lighting plant is also owned by the municipality. Over $1,000,000 has been expended in recent years on a new and improved sewer system. The street railways operate over 85 miles of track, all converging at a central transfer station.

Buildings.— Prominent among the noticeable structures are the State Capitol, costing $1,500,000; United States Government Building; Davidson County Court House; the City Hall; Tennessee School for the Blind; Tennessee Industrial School; the State Penitentiary; the Parthenon; City Hospital; Confederate Soldiers' Home; Vendome Theatre; the new Union Depot; and the various churches and educational institutions.

Education.— There is no city in the South as prominent in educational interests as Nashville. Here is the seat of the Vanderbilt University; the University of Nashville; Peabody School for Teachers; Medical and Dental Departments of the University of Tennessee, the rest of which is located at Knoxville; Ward Seminary; Belmont College; Boscobel College; Watkins Institute; St. Cecilia Academy; Fisk University; Roger Williams University; Walden University. The State Library contains 40,000 volumes. The Carnegie Library cost $100,000 and has a fine and rapidly increasing number of volumes. The Tennessee Historical Society has a large and valuable library, many rare manuscripts, portraits, etc. The public schools are of the highest rank, and embrace, in addition to the ordinary studies ranging into the high school education, departments of industrial education, stenography, typewriting, bookkeeping.

Parks and Cemeteries.— In the park surrounding the State Capitol building is the tomb of James K. Polk (q.v.) and an equestrian statue of Andrew Jackson. The Hermitage, the former home of Jackson, is 10 miles east of the city. To the north is the National Cemetery where are buried 16,643 soldiers who fell in the Civil War. A Centennial Park has been made on the grounds of the Tennessee Centennial Exposition of 1897, and the former history building is now a museum and art gallery. In the park is a fine monument honoring James Robertson, the founder of Nashville. Watkins Park is to the west. Shelby Park, to the east of the city, is a natural shaded tract with a river frontage. Glendale Park, to the south, is a place of unrivaled beauty. There is also here Mount Olivet Cemetery, with the beautiful Confederate soldiers' monument, and the Cumberland Driving Park.

Manufactures.— The industries of Nashville, which are more extensive than any other city in the State, had in 1909 aggregate capital of $27,880,000, and manufactured products valued at $29,650,000. The manufactures include flour, grist-mill products, lumber and timber products, fertilizers, cotton goods, clothing, harness, saddlery, soap, stoves, ranges, hollow ware, coffins, shoes, candles, tobacco, wagons, carriages, and confectionery. There is a large export trade and extensive wholesale traffic in dry goods, boots and shoes, groceries and drugs. The wholesale trade is estimated at over $60,000,000 annually. Almost at the doors of Nashville, and tapped by every line of railroad entering the city, are apparently inexhaustible fields of coal of the highest grade. The bountifulness of the supply is attested by the fact that during the prolonged anthracite coal strike, when coal was selling at almost prohibitive prices in every other section of the country, there was absolutely no advance in the price of coal in Nashville.

History.— The city was settled in 1780 by a band of pioneers under the leadership of James Robertson. It was named in honor of Gov. Abner Nash of North Carolina and was called Nashborough until 1784. During the early years of its existence Nashville was repeatedly attacked by the Cherokees and other Indian tribes. It was chartered as a city in 1806; was the seat of the State legislature in 1812–15, and became the permanent State capital in 1843. The Federal army occupied the city in 1862 and around the city in 1864 was fought one of the great battles of the Civil War. (See NASHVILLE, BATTLE OF.) In 1896, the State celebrated the centennial of Tennessee's admittance into the Union, and a great industrial exposition was held here the following year.

Population.— Nashville in 1830 had a population of 5,566; (1850) 10,165; (1860) 16,988; (1870) 25,865; (1880) 43,350; (1890) 76,168; (1900) 80,865; the 1900 total included 3,037 persons of foreign birth and 30,044 of negro descent; (1910) 110,364.

R. A. HALLEY,
Retail Merchants Association, Nashville, Tenn.

Nash'ville, the name of a Confederate privateer that left Charleston in 1861 on a cruise to England and captured booty to the amount of $3,000,000. In March 1863 she was sunk by a Federal ironclad at the mouth of the Savannah River.

Nashville, Campaign and Battle of. When Gen. Sherman's picked army of 62,000 left Atlanta 15 Nov. 1864 for the March to the Sea (q.v.) the Confederate army under Hood, strengthened by Forrest's cavalry, was on the Tennessee River in the vicinity of Tuscumbia and Decatur, with S. D. Lee's corps across the river and in advance of Florence. Active preparations were making for a move on Nashville with the Ohio as a possible objective. Gen. Thomas had been sent to Nashville six weeks before to organize a force to resist Hood. Toward the last of October the Twenty-third corps, Schofield's, and the Fourth, D. S. Stanley's, were ordered to Thomas, who sent them under Gen. Schofield to Pulaski, with orders to delay Hood as long as possible to allow of the needed concentration and organization at Nashville. This infantry force at Pulaski aggregated 18,000 effectives, one division of the Twenty-third corps being detached, and was further strengthened by four brigades of cavalry under Gen. James H. Wilson. Forrest's force of Confederate cavalry was four times

Wilson's. Gen. Sherman thus describes the force with Gen. Thomas at Nashville at the time of Hood's advance on Pulaski: «Gen. Thomas was at Nashville with Wilson's dismounted cavalry, and a mass of new troops and quartermaster's employees amply sufficient to defend the place.» Of the sound men sent back to Thomas by Gen. Sherman when he was fitting out a perfect army for the March to the Sea, he lost 15,000 from expiration of service, or from furloughs previously granted, within a week after Hood's advance from Florence. In place of these 15,000 Thomas received 12,000 newly enlisted recruits. To secure Chattanooga Sherman telegraphed Gen. Steedman, who held the place with a small force, «You must organize and systematize the hospitals and men sent back to Chattanooga»; and to a suggestion that he might make use of some of the convalescents he was receiving from Atlanta he replied: «So far, all such detachments reported from the front are with furloughs and are awaiting transportation home.»

Under such conditions Gen. Thomas was working most energetically at Nashville to organize an army to meet Hood, while Gen. Schofield, with his inferior force, was holding against him with the utmost stubbornness to gain time for Thomas.

Hood was baffled in his attempt to intercept Gen. Schofield at Pulaski and Columbia, Schofield reaching the latter place, forming solidly before Hood, who arrived 27 November, and holding him there to the limits of possibility. Again, by skilful work, Schofield reached Franklin in advance of Hood, marching his troops at night within rifle-shot of the enemy's lines at Spring Hill. Here Hood threw his army *en masse* upon Schofield, who had taken position around the town. The attack was delivered at 4 P.M., and lasted into the night. It was one of the most desperate assaults of the Confederates on any field, and most depressing for them in its results, five general officers being killed, six wounded, and one captured. (See FRANKLIN, BATTLE OF.) The night of the 30th Schofield withdrew to Nashville, and the morning of 1 December Thomas' army was united.

A part of A. J. Smith's veteran division arrived at Nashville during the battle of Franklin, but not in time to be sent to Gen. Schofield. The rest of his division, and Gen. Steedman's division from Chattanooga also arrived 1 December.

Hood advanced the day after the battle of Franklin and established his lines in front of Nashville 2 December. Not until Hood appeared before Columbia with the entire army that had confronted the three armies under Sherman, re-enforced with Forrest's 10,000 cavalry, and the fact appeared that Schofield was fighting a gallant, almost desperate game to hold him back while Thomas was working energetically to organize his forces, did the authorities at Washington and City Point realize that Thomas had been left with wholly inadequate means. In reply to a telegram from Gen. Grant in which he was directed not to «let Forrest get off without punishment,» Gen. Thomas, 24 November, thus stated his real condition.

> Your despatch of 4 P.M. yesterday just received. Hood's entire army is in front of Columbia, and so greatly outnumbers mine at this time that I am compelled to act on the defensive. None of General Smith's troops have arrived yet, although they embarked at Saint Louis on Tuesday last. The transportation of Generals Hatch's and Grierson's cavalry was ordered by General Washburn I am told, to be turned in at Memphis, which has crippled the only cavalry I had at this time. All of my cavalry was dismounted to furnish horses to Kilpatrick's division, which went with General Sherman. My dismounted cavalry is now detained at Louisville, awaiting arms and horses. Horses are arriving slowly, and arms have been detained somewhere en route for more than a month. General Grierson has been delayed by conflicting orders in Kansas, and from Memphis, and it is impossible to say when he will reach here. Since being placed in charge of affairs in Tennessee, I have lost nearly fifteen thousand men discharged by expiration of service and permitted to go home to vote. My gain is probably twelve thousand perfectly raw troops. Therefore, as the enemy so greatly outnumbers me, both in infantry and cavalry, I am compelled for the present to act on the defensive. The moment I can get my cavalry, I will march against Hood, and if Forrest can be reached he shall be punished.

This created a feeling at Washington and City Point approaching a panic. It was feared that Hood might avoid Thomas, cross the Cumberland, and carry out President Davis' plan to have him push on to the Ohio. This fear was redoubled when the necessity appeared for Schofield to retire from Franklin. It was not so clearly seen that his stubborn holding against Hood had saved the situation which Sherman created. Instead of leaving Thomas, who up to that time had never lost a movement or a battle, to deal with Hood as his full knowledge of the situation might suggest, it was insisted that he should at once attack. The straits of the situation were recognized at City Point, and the day after Schofield's arrival Grant telegraphed: «Arm and put in your trenches your quartermaster's employees, citizens, etc.» The fourth day Thomas was peremptorily ordered to attack. He calmly went on with his energetic preparations to deal a final blow to Hood. His despatches, clearly showing his situation and his active work, were ridiculed by Stanton and Halleck, and Grant repeated his orders to attack, and next directed Halleck to relieve him, first with Schofield, and next with Logan, and Grant himself started to take general direction, although Thomas had explained that while he had the troops ready to attack, a sleet-storm had covered the country with a sheet of ice upon which neither men nor horses could move, but that the moment it melted he would attack. When Logan reached Louisville he was met with the news of an overwhelming victory.

The two-days' battle, 15 and 16 December, was remarkable for its perfection of plan, and for the fact that in its progress to the end this plan was closely followed.

The Confederate main and advanced lines were intrenched on bold hills about two miles from the city. Their advanced salient was established within three eighths of a mile of the Union centre. The Union lines extended from the river above the city to the river below it. The Confederate lines were compact between the Murfreesboro railroad at their right and the Hillsborough turnpike, which ran south from the centre of the city, across the Union centre. Thus the Confederate lines covered less than half of the Union position. Cheatham's corps was on the right, Lee's corps formed the centre, and Stewart's corps the left.

More than half the inner line was held by quartermasters' employees under Q. M. G. Donaldson, and the rest of that line by new troops under Gen. J. F. Miller. Gen. A. J. Smith's corps held the right of the advanced Union line, Gen. T. J. Wood's line the centre, and Gen. Schofield the left. Gen. Steedman's division was in echelon to the front on the left. The night before the battle Gen. Schofield's corps was moved to the left and front of Wood's line, and prepared to take prominent part in turning the Confederate left. The morning of the 15th fog veiled the rapid formation of Union forces in front of their works.

The battle began at 8 o'clock by a successful attack by Gen. Steedman's division upon the earthworks commanding the extreme left. This attracted the enemy's attention to that quarter. About 10 o'clock Smith's corps moved against Hood's left, and Wilson's cavalry corps of 9,000 horsemen and 3,500 dismounted men swung off in its wide circuit against the left and rear of the Confederate works, one division extending to the river below the city, and forcing back Hood's cavalry reserve under Gen. Chalmers. Forrest's main body had been sent to attack Murfreesboro. Smith's corps moved obliquely against the Confederate left flank and took it in reverse. Schofield, by a wide detour, penetrated still further to the rear. At the same time Wood assaulted in front. Wilson's troopers carried earthworks, captured 27 guns, and swept squarely into the rear of the Confederate left. These movements compelled its withdrawal for two miles. The next afternoon the same tactics were continued by Smith, Schofield, and Wilson, while Wood on the Union centre, and Steedman on the left, pushed forward to Hood's new line. This had been reformed with Cheatham on the left, Stewart in the centre, and Lee on the right. The Union lines began the attack upon Hood's position at 3 o'clock with an unsuccessful assault by two brigades from Wood and one from Steedman upon the Confederate right. Soon after 4 o'clock Smith and Wood's corps on the front, with Schofield operating on their right and against the Confederate left flank, attacked in force, soon carrying the entire line. This attack and its results Gen. Hood thus described in his official report: "The position gained by the enemy being such as to enfilade our line caused in a few moments our entire line to give way, and our troops to retreat down the pike in the direction of Franklin, most of them, I regret to say, in great confusion, all efforts to reform them being fruitless." Here 54 guns in position were captured. There was immediate and hot pursuit for 9 days, led by Wilson's cavalry, when the remnant of Hood's forces crossed the Tennessee, having suffered a loss during his campaign of over 13,500 prisoners and 72 guns, and here the Union pursuit ended. Over 2,000 deserters came into the Union lines.

The result vindicated Thomas' insisting upon waiting for the remounting of his cavalry, since Wilson with his troopers formed an essential and controlling element in the battle and in a pursuit which were designed to disintegrate an army.

The records do not show the number of men with which Hood reached Tupelo. He claims that there were 18,500 left there after 3,000 were furloughed. He further says that of 14,000 that left Tupelo to join Gen. J. E. Johnston in North Carolina 9,000 deserted. Gen. Johnston's reports show that when Hood's forces reached him they numbered 3,953 officers and men. Thus, after Nashville, Hood's splendid force of Confederate fighters did not again appear as an army on the theatre of war.

Even this complete victory, defeating the contemplated advance of the Confederate army to the Ohio, did not fully allay the panic at Washington lest Sherman's movement to the sea should prove to have left the Central West without sufficient protection, and while every possible effort in pursuit was being put forth in horrible weather, Gen. Halleck thus telegraphed Thomas:

> Permit me, General, to urge the vast importance of a hot pursuit of Hood's army. Every possible sacrifice should be made, and your men for a few days will submit to any hardships and privations to accomplish the great result. If you can capture or destroy Hood's army General Sherman can entirely crush out the rebel military force in all the Southern States. He begins a new campaign about the first of January, which will have the most important results if Hood's army can now be used up. A most vigorous pursuit on your part is, therefore, of vital importance to General Sherman's plans. No sacrifice must be spared to obtain so important a result.

Gen. Thomas, nagged beyond endurance, put an end to this style of despatches by the following reply:

> Your despatch of 12 M., this day, is received. General Hood's army is being pursued as rapidly and as vigorously as it is possible for one army to pursue another. We can not control the elements, and you must remember that, to resist Hood's advance into Tennessee, I had to reorganize and almost thoroughly equip the force now under my command. I fought the battle of the 15th and 16th instant with the troops but partially equipped; and, notwithstanding the inclemency of the weather and the partial equipment, have been enabled to drive the enemy beyond Duck River, crossing two streams with my troops, and driving the enemy from position to position without the aid of pontoons, and with but little transportation to bring up supplies of provisions and ammunition. I am doing all in my power to crush Hood's army, and, if it be possible, will destroy it. But pursuing an enemy through an exhausted country, over mud roads completely sogged with heavy rains, is no child's play, and can not be accomplished as quickly as thought of. I hope, in urging me to push the enemy, the department remembers that General Sherman took with him the complete organization of the Military Division of the Mississippi, well equipped in every respect, as regards ammunition, supplies, and transportation, leaving me only two corps, partially stripped of their transportation to accommodate the force taken with him, to oppose the advance into Tennessee of that army which had resisted the advance of the army of the Military Division of the Mississippi on Atlanta, from the commencement of the campaign till its close, and which is now, in addition, aided by Forrest's cavalry. Although my progress may appear slow, I feel assured that Hood's army can be driven from Tennessee, and eventually driven to the wall by the force under my command. But too much must not be expected of troops which have to be reorganized, especially when they have the task of destroying a force, in a winter's campaign, which was able to make an obstinate resistance to twice its numbers in spring and summer. In conclusion, I can safely state that this army is willing to submit to any sacrifice to crush Hood's army, or to strike any other blow which may contribute to the destruction of the rebellion.

This changed the tone of despatches from Washington and City Point. Grant and Stanton sent congratulations, and Grant, in his official report, after setting forth his impatience and apprehensions that Hood would go north, said of Thomas: "But his final defeat of Hood was so complete, that it will be accepted as a vindication of that distinguished officer's judgment."

H. V. Boynton.

Nashville, University of, in Nashville, Tenn., a coeducational institution founded in 1785 by the State of North Carolina as Davidson Academy. In 1806 after Tennessee had been founded, the name was changed to Cumberland College, and in 1826 to the University of Nashville. The school was closed during the Civil War. The trustees of the university and of the Peabody Fund united in 1875 in establishing a normal school for the training of teachers. Montgomery Bell Academy and Winthrop model school constitute the preparatory department, and the other departments are collegiate and medical. The courses of study lead to the degrees of A.B., B.S., and B.L. In 1909 there were connected with the school 66 professors and instructors and about 1,100 students. In the preparatory department there were 200 pupils. The library contained over 26,000 volumes, and the grounds, buildings and furnishings were valued at $250,000; the productive fund was about $106,500; and the annual income about $60,000.

Nashville, Chattanooga & St. Louis Railway. The first advocate of the building of the Nashville & Chattanooga Railroad, the first railroad built in the State of Tennessee, was Dr. James Overton, a man of far-reaching sagacity, dauntless courage, and great faith in his well-matured convictions. In 1843, he offered himself as a candidate for the Legislature, basing his canvass on the promise that he would do all in his power to secure the construction of a railroad from Nashville to Chattanooga, to connect with the Western & Atlantic Railroad, which had been chartered as a link in that great trunk line that was to extend from the Atlantic coast to the Mississippi river. At that period Chattanooga, or Ross' Landing as it was then called, was nothing more than a small shipping point in a wild, mountainous region, and had but lately been vacated by the Indians. Dr. Overton, with keen foresight, however, recognized that this was the focus to which the lines of traffic from the Southern States must converge, and he believed that if connections should be opened between that point and Nashville the latter place would be able to control the large cotton trade of Georgia and Alabama. These arguments made little impression upon the minds of the people, however, and Dr. Overton was not only defeated but the title "Old Chattanooga," was applied to him by those who derided his scheme as the impracticable dream of a visionary.

Two years after the defeat of Dr. Overton the necessity for other outlets from Nashville besides the Cumberland river brought the subject of railroads under agitation again, and, through the pressure of many influential citizens of the State, the Legislature passed an act on 11 Dec. 1845, incorporating a railroad from Nashville to Chattanooga. In 1847, this act was amended to permit the town of Nashville to subscribe the sum of $500,000 for the benefit of the road, and "to raise money on loans by pledging the faith of the corporation; by pledging a portion of its taxes; by mortgage or otherwise to an amount not exceeding what might be demanded for the calls on the stock." It was from this beginning that the Nashville, Chattanooga & St. Louis Railway has been developed.

V. K. Stevenson was the first president of the company, and he held this position until 1861. In 1864, Michael Burns was elected president. He served until 1868, when he was succeeded by Col. E. W. Cole, who resigned in 1880. Gov. James D. Porter, who succeeded him served until 1884, when Major J. W. Thomas, the former general manager, was elected president.

Since 1868, when the company actually began to extend its lines, it has increased its mileage from 554 miles to 1,201.25, and has augmented its earning capacity nearly fourfold, its equipment also having grown in about the same ratio. The first train ran from Nashville to Antioch on 13 April 1851, and when, on the 4th of July of the same year, a train arrived at Murfreesboro, the event was made the occasion of a great celebration, people from all the country round being on hand to greet this sign of progress. By April 1852, the road had reached Bridgeport, Ala., on the Tennessee river, from which point communication was immediately opened with Chattanooga with the aid of steamboats, but the entire line, which was 151 miles in length, was not completed until February 1854. Even then it was the first railroad to be completed in the State.

During the past 30 years the system has been gradually extended until, as has been said, at the present time, including its leased lines, it consists of more than 1,200 miles. Besides the main lines there are 353.05 miles of side lines, making a total mileage under the present management of 1,554.30 miles. Included in these leased lines are the systems of the Western & Atlantic Railroad, and the Memphis & Paducah Railroad, the system of the Nashville, Chattanooga & St. Louis Railway now extending from Hickman, Ky., through Nashville and Chattanooga, Tenn., to Atlanta, Ga. It also extends from Memphis, Tenn., to Paducah, Ky., passing through Jackson, Tenn. It also reaches the great cotton manufacturing city of Huntsville, Ala., while other ramifying branches extend to various mining centres, agricultural districts, and timber regions. To-day, the road has no superior, whether we consider the excellence of its road-bed; its admirable equipment; the beauty and attractiveness of its scenery, or the fertility of the country through which it passes, while its strategical position in relation to the commerce of the land is not surpassed by that of any other railroad system in the South. At Memphis, for example, it converges with a clustered system of railroads that run to every point of the compass. Among these lines are the Louisville & Nashville Railroad, the Illinois Central Railroad, the Missouri Pacific Railroad, the Memphis & Little Rock Railroad, the Memphis & Kansas City Railroad, and the Southern Railroad. It is also brought in closest touch with the great river trade of the Mississippi and its tributaries at several points, reaching the Mississippi river at Memphis and Kickman, Ky.; the Ohio river at Paducah, Ky., and the Tennessee river at Johnsonville, Penn.; Bridgeport, Ala.; Hob's Island, Ala.; Guntersville, Ala., and at Chattanooga. It strikes the Cumberland river at Nashville and crosses the Chattahoochie river near Atlanta, Ga. At many points it also unites with such a large number of railroads that it would be difficult to name any other road in the South that forms such a close link between the best systems of railways in that portion of the country as well as the best navigable streams throughout the southern country.

The following table furnishes a concise statistical view of the development of the Nashville.

Chattanooga & St. Louis Railway system from 1884 to 1904, inclusive:

	1884.	1904.	Increase.
Miles owned......	505	810	305
Miles operated...	554	1,201	647
Locomotives......	79	224	145
Freight cars......	1,888	7,772	5,884
Passenger cars...	60	201	141
Weight of rail (pounds)........	52 & 58	80	
Weight of locomotives (tons).....	40	80	
Gross earnings...	$2,372,086 46	$10,206,022 33	$7,833,935 87
Earnings per mile	4,281 74	8,497 94	4,216 20
Bonded indebtedness...... . .	8,903,000 00	16,121,000 00	7,218,000 00

J. W. Thomas,
Late President.

Nashville Convention, in American history, a convention of delegates from the Southern States held at Nashville, Tenn., in June 1850, called to consider the slavery question and the encroachments of Northern abolitionists. The Wilmot Proviso and the Missouri Compromise were disapproved, but resolutions of open resistance advanced by Texas, South Carolina and Mississippi were voted down. The convention which was never generally popular, met again in November, and again moderate resolutions were adopted.

Nasik, nä'sĭk, or **Nassick,** India: (1) the capital of a district of Bombay on the Godavari, 31 miles from its source, and 100 miles northeast of Bombay. It is the headquarters of Brahmanism in the Deccan and one of the most sacred of Hindu pilgrim resorts; the banks of the river here are crowded with temples and shrines. Nasik is the Nasica of Ptolemy and was anciently a Mahratta capital. It has noted manufactures of brass and copper work, paper, cotton, etc. Pop. about 21,500. (2) The district has an area of 5,940 square miles; pop. about 825,000.

Nasmyth, nā'smĭth, **Alexander,** Scottish painter: b. Edinburgh 9 Sept. 1758; d. there 10 April 1840. He chose portrait painting as his specialty; became Allan Ramsay's pupil and subsequent assistant and accompanied that artist to London. He returned to Edinburgh (1779); and traveled in Italy (1782), where he devoted himself to landscape and historical painting. Among his works is the famous portrait of Burns in the London National Gallery, the large 'River Scene' owned by the Society of Arts; 'The Port of Leith' (1824); and 'The Lawn Market' (1824); in 1822 he published 16 scenes described by Sir Walter Scott. His landscapes are finely composed and very impressive, though he is inferior as a painter to his son Patrick (q.v.). The Nasmyths were an artistic race and between 1829 and 1866 no less than six woman painters of the family exhibited in London.

Nasmyth, James, Scottish engineer: b. Edinburgh 19 Aug. 1808; d. South Kensington, 7 May 1890. He was the son of Alexander Nasmyth (q.v.), the Scottish landscape painter. After study at Edinburgh University, he went to London in 1829, offered his services to Mandsley, founder of a well known engineering firm, and was appointed assistant in his private workshop. There he remained till 1831, when he returned to Edinburgh, and constructed a set of engineering tools with which he began business in 1834 at Manchester. Here he was so successful that he had soon to erect a large new workshop at Patricroft near Manchester, where he became famous as a machine constructor and inventor. Chief among his inventions was the steam-hammer, designed in 1839, and in 1842 patented in an improved form. The first hammer was constructed from a view of Nasmyth's sketches by Schneider at Creuzot, in France, about 1841; but the first British one was erected by Nasmyth at Patricroft in 1843. Among Nasmyth's further inventions are a nut-shaping machine, a hydraulic punching-machine, and a flexible shaft for driving small drills. In 1856 he retired from the firm of Nasmyth, Gaskell & Co., which he had founded, and devoted himself to the study of astronomy. He was the first to observe the mottled appearance of the sun's surface known as «willow-leaves» or «rice grains» (1860). He is the author of 'Remarks on Tools and Machinery' in Baker's 'Elements of Mechanism' (1858); 'The Moon Considered as a Planet, a World, and a Satellite' (1874), with James Carpenter; and an autobiography edited by Dr. S. Smiles (1883).

Nasmyth, Patrick Milner, Scottish painter: b. Edinburgh 7 Jan. 1787; d. Lambeth, London, 17 Aug. 1831. He studied under his father and developed a great talent for landscape, though he labored under the difficulties of ill health, and a crippled right hand which necessitated the use of the left in painting. He came to London in his 20th year and made his reputation by his first picture exhibited at the Royal Academy 'A View of Loch Katrine' (1809). He invariably painted *en plein air,* and in his last sickness was raised on his bed that he might watch through the window the violent thunderstorm that was raging outside and in the progress of which he expired. His pictures are highly valued and his 'View in Surrey' sold (1892) for £2,625 ($13,125).

Naso, nā'sō. See Ovid.

Na'son, Elias, American biographer: b. Wrentham, Mass., 21 April 1811; d. North Billerica, Mass., 17 June 1887. He was graduated from Brown University in 1835, engaged in teaching and was ordained a Congregationalist minister in 1852. He was the author of: 'Life of Governor Andrew' (1868); 'Life of Charles Sumner' (1874); 'Lives of Moody and Sankey' (1877); 'Originality' (1882); and many other works.

Nason, Emma Huntington, American poet: b. Hallowell, Maine, 6 Aug. 1845. She was graduated from the Maine Wesleyan Seminary and Female College in 1865 and was married to C. H. Nason of Augusta, Maine, where she has since resided. She has published 'White Sails' (1888), and 'The Tower, with Legends and Lyrics' (1895).

Nasqa, näs-hä'. See Nass Indians.

Nasr-ed-Deen, näs'r-ĕd-dēn', Shah of Persia: b. 24 April 1831; d. 1 May 1896. He was not the eldest son but the ability and influence of his mother induced his father, Mohammed Mirza, to proclaim him his heir and he succeeded to the throne in 1848. His accession was disputed by the reformer El Bab, but the new shah crushed the opposition mercilessly and became the ablest ruler that Persia had had in many years. He studied European methods of warfare and proved himself a master of finance. He crushed the insurrections which broke out in various provinces and by his occupation of Herat in 1856 provoked a war with Great Britain which was concluded in 1857. In 1873-8 and in 1889 he visited Western Europe and endeavored to establish more friendly relations with England, soon, however, returning to his friendship with Russia. He favored progress and western civilization in so far as it did not conflict with his despotic rule, and under his reign the telegraph through Persia connecting Europe and India was built. He was assassinated in 1896.

Nass (näs) **Indians**, or **Nasqa**, or **Nishgar**, a general name for several tribes residing on the Nass River, British Columbia. They live in seven villages and number perhaps 1,000. They have not decreased in numbers in recent years and are steadily improving in morals and intelligence.

Nassau, näs'sow, **Joan Mauritz van,** COUNT OF NASSAU-SIEGEN, Dutch general and statesman: b. Delft, Holland, 17 June 1604; d. Cleves, Prussia, 20 Dec. 1679. He was governor-general of the Dutch possessions in Brazil in 1637-44 and had a brilliant and prosperous administration. He defeated the Spanish and Portuguese and upon his return to Holland was made lieutenant-general of cavalry; in 1647 he was governor of Cleves and in 1665 commanded the army of the Netherlands. He became governor of Utrecht in 1674.

Nassau, Germany, a former independent duchy, now as Wiesbaden, forming a district of the Prussian province of Hesse-Nassau (q.v.). The chief town is Wiesbaden (q.v.). The family of Nassau, the elder branch of which reigned till 1866, dates from the 10th century. The younger branch inherited in 1544 the principality of Orange (q.v.), and as the princes of Orange took an important place in European history. The reigning Duke of Nassau sided against Prussia in 1866, and his duchy was incorporated with Prussia (see PRUSSIA: GERMANY). On the extinction of the male line of the Orange branch by the death of William III. of Holland, in 1890, the Duke of Nassau became Grand-Duke of Luxemburg.

Nassau, năs'â, the capital of the Bahama Islands (q.v.), situated on the north coast of New Providence, the largest island of the group. The town is built on a steep hill, is well laid out, and has fine government and other public buildings, and handsome residences. The climate is mild and healthful, and Nassau is a popular winter health resort for Americans and West Indians. There is a good harbor, and an active general trade is carried on. The United States is represented by a consular agent. Pop. 10,000.

Nassau, Fort, N. J., a former fort on the Delaware River, near the present site of Gloucester, N. J. The fort was built by Capt. Jacobus May, in 1831.

Nasse, näs'sĕ, **Erwin,** German political economist: b. Bonn 2 Dec. 1829; d. there 4 Jan. 1890. He was educated in Bonn and became prominent as an economist. In 1869-79 he served in the Prussian Lower House and in 1889 became a member of the House of Peers. He founded and was president of the Verein für Socialpolitik. He published: 'Ueber das preussische Steuersystem' (1861); 'Ueber die mittelalterliche Feldgemeinschaft in England' (1869); 'Agrarische Zustände in England' (1884); etc.

Nassick. See NASIK.

Nast, Thomas, American caricaturist: b. Landau, Bavaria, 27 Sept. 1840; d. Guayaquil, Ecuador, 7 Dec. 1902. His mother brought him to this country in 1846. He was employed as doorkeeper in Bryant's Art Gallery, Broadway and 13th Street, New York, where he spent his spare time copying the paintings. For six months he studied in a drawing class, then became a draughtsman for 'Frank Leslie's.' In 1860 he was sent to England to draw for the 'Illustrated News' the Heenan-Sayers prize fight; in 1861 drew sketches of the Italian campaign; in 1862 joined the 'Harper's Weekly' staff and by his clever cartoons soon became famous. But with his purely political and personal caricatures dating from 1871-3, when he attacked the Tweed Ring in New York city, drew the money-bag head of Tweed and the first Tammany tiger, and largely contributed to the defeat of the Ring, he came to new fame and power. He bitterly opposed Greeley in 1872, Tilden in 1876, and Hancock in 1880, urging against each of these nominees his inevitable connection with Tammany Hall. In 1884 he attacked the Republican candidate for the only time, but with unusual bitterness. He left 'Harper's Weekly' in 1887, and in 1894 became a member of the staff of the *Pall Mall Gazette*. In May 1902 he was appointed United States consul at Guyaquil, where he died of yellow fever. For several years he published 'Nast's Almanac,' with his own illustrations to text by various authors. Nast did some oil-painting, especially of scenes in the Civil War. He was a great caricaturist, as realistic as the French masters in his groups and as dignified as Tenniel in his single figure cartoons.

Nastur'tium, the Indian cress (*Tropæolium majus*), an American climbing annual with pungent fruits and showy orange flowers; or *T. minus*, a smaller species. See TROPÆOLIUM; CRESS.

Na'sua. See COATI.

Nat Turner's Rebellion, in American history, a term applied to a negro insurrection at Southampton, Va., in 1831. The rebellion was led by Nat Turner, a negro slave, who believed himself chosen by God to free the colored race. At an appointed time he set out with several hundred followers going from house to house with the intention of killing all white persons. Before the authorities dispersed the rebels 55 persons were killed. After hiding for some weeks in the Dismal Swamp, Turner was captured and hanged.

Nata, nä'tä, in Mexican mythology, the name of a former legendary prophet, who resembled the Noah of Biblical times.

Natal, na̤'täl', Africa, a British colony on the southeast coast, bordering on the Indian

Ocean, and bounded by Portuguese East Africa, the Transvaal, and Orange River colonies, Basutoland, and Cape Colony. Including Zululand, annexed in 1897, it has an estimated area of 35,019 square miles. In January 1903 the former Transvaal districts of Vryheid, Utrecht, and part of Wakkerstroom were transferred to Natal.

Topography.— The chief natural boundary on the land side is formed by the Drakensberg Mountains, separating it from the Orange River Colony and Basutoland. The Tugela River separates the colony proper from the Zulu country; on the southwest the Umzimkulu and Umtamvuna partly separate it from Cape Colony. The 400 miles of coast-line contains the mouths of numerous streams, but is destitute of creeks and bays, having only one sheltered anchorage at Port Natal (on which stands the seaport Durban), a fine circular bay completely landlocked, capacious enough to contain whole fleets, and deep enough within to float the largest vessels. The surface is finely diversified, rising by successive terraces from the shore toward the lofty mountains on its western frontiers. The chief summits are Champagne Castle, 10,357 feet; Mont aux Sources, about 10,000 feet; and Giant's Castle, 9,657 feet. From the main chain numerous transverse branches proceed nearly at right angles, and form a series of minor watersheds, separating the different streams. The mountains descend very gradually on the west, and may be regarded as the abutments of a very elevated table-land, but they present precipitous fronts to the east, and are so broken by chasms and ravines that they were at one time regarded as impassable.

Hydrography.— The colony has a great advantage over most of the districts of South Africa in its abundance of perennial streams, though these are all too shallow to be navigable, while many flow through precipitous ravines and rocky gorges. The most important rivers are the Tugela, which has a course of about 150 miles, its tributary, the Buffalo, or Umzinyati, being also a considerable stream; the Umvoti, Umgeni, and Umkomanzi, farther to the south; and the Umzimkulu, which partly separates Natal from Cape Colony.

Geology and Mineral Resources.— The prevailing stratified rocks are sandstone and slate, often thrown into confusion and pierced by igneous rocks, particularly basalt, greenstone, and porphyry, which assume the form both of continuous ridges and isolated hills, and often cover extensive areas. The mineral productions are principally coal, iron-stone, limestone, and marble. Coal is worked and is used on the railways, and the iron-stone is also being utilized. There are rich gold-fields in Zululand.

Climate.— The climate on the whole is extremely salubrious. On the coast the range of temperature is from 47° to 88°, giving an average in summer of 76° and in winter of about 55°; in the interior, at the town of Pietermaritzburg, the mean temperature of July, the coldest month, is 55°; of February, the hottest, 80½°; and of the whole year, 67°. During the rainy season (October to March) thunder showers are of almost daily occurrence. Long droughts are almost unknown.

Vegetation.— Under such a climate, and with a soil of considerable fertility, vegetation is obviously vigorous. Timber-trees everywhere exist in sufficient numbers for the wants of the colony, and on the western frontiers as well as elsewhere form considerable forests, for the most part unencumbered by the underwood which prevails in Cape Colony.

Fauna.— The wild animals include the leopard, hyena, tiger-cat, antelopes, jackal, antbear, and porcupine. The hippopotamus has still his haunts in several of the rivers, and there are numbers of small crocodiles; while snakes, some of them venomous, are also plentiful. The birds comprise the vulture, several varieties of eagle, and the secretary-bird, etc.

Agriculture.— In the level districts of the interior, wheat, barley, oats, beans, and vegetables of almost every description have been largely and successfully grown; but the chief crop everywhere is maize, of which even two good crops can be raised in the year. In many parts the vine thrives well, various fruits are cultivated, and could be produced in unlimited quantities. In the coast districts, where the climate is tropical, the sugarcane is cultivated with success. In similar localities tobacco, arrowroot, ginger, bananas, pine-apples, etc., also grow well. Tea has begun to be cultivated with good prospects, and coffee is also grown to a small extent.

Commerce, etc.—In 1901 the total value of exports amounted to about $23,000,000, wool being by far the largest, others being gold, sugar, coal; the imports were valued at about $48,000,000, mostly manufactured goods. The railways, which belong to the government, have a length of over 600 miles, and extend into the Orange River Colony and Transvaal.

Government.— Natal has since 1893 been under a governor, a legislative council, and a legislative assembly. The governor represents the king, and is appointed by the home government. He appoints an executive of not more than six ministers, and with their advice nominates the members of the legislative council, a body consisting of 12 persons. The legislative assembly consists of 39 elected members, the electors having the right of voting in virtue of a small property qualification. The assembly is elected for a term of four years, but may be dissolved before the end of this period. All bills must receive the governor's assent before they become law. For administrative purposes the colony is divided into counties, of which that of Pietermaritzburg is so named from containing the capital, situated about 54 miles inland. The only seaport, and the largest town, is Durban, on Port Natal. There are somewhat special regulations for Zululand, which at present bears the designation of a "province." Education is well attended to, there being government high and primary schools, many aided private schools, and schools for Kaffir and coolie children.

History.— Natal owes its name to having been discovered on Christmas Day, 1497, by Vasco da Gama. In 1823 a small English settlement was formed on Port Natal. Subsequently large numbers of discontented Boers from the Cape Colony entered the country as settlers. A treacherous massacre of part of the Boers by Dingaan, chief of the Zulus, in 1838, led to hostilities, in which Dingaan was ultimately driven beyond the frontiers. In 1839 the Boers proclaimed themselves an independent republic, also declaring their determination to establish diplomatic relations with European powers. The establishment of a hostile settlement at the only port between Algoa and Delagoa bays, and at a valuable entrance from the coast to the interior of South Africa, was so obviously incompatible with British interests that a force was despatched from the Cape, and after some fighting the Boers submitted, except a discontented section, who retired beyond the Drakensberg range. The territory was proclaimed British in 1843. It formed an integral part of the Cape Colony until 1856, when it was erected into a separate colony. Its prosperity has been affected by the Kaffir troubles, as well as by the British complications with the Transvaal Boers; and in 1899–1900 it suffered severely in the South African war (q.v.). Pop. about 975,000, including 786,912 Kaffirs, 74,385 Asiatics, and 63,821 Europeans; the newly transferred Transvaal districts, already mentioned, give an additional 58,000, comprising 50,000 Kaffirs and 8,000 Europeans.

Natal, Brazil, the principal seaport and capital of the state of Rio Grande do Norte, at the mouth of the river of that name, on the Atlantic, 150 miles north of Pernambuco. Notwithstanding the sand-bars at the entrance to the harbor, considerable export trade is carried on chiefly of cotton, sugar, rubber, etc., about $1,000,000 annually. The United States is represented by a consular agent. Natal was originally called Cidade dos Reis. Pop. 10,000.

Natalie, năt'a-lē, a queen of Servia: b. 14 May 1859. She is a daughter of Pierre Ivanovitch Keschko, a Russian officer, and married Prince Milan, afterward king of Servia, in 1875. The marriage turned out unhappily, and the union was broken in 1888, when Milan obtained a divorce. The king abdicated in the following year, and Natalie, returning to Belgrade, the Servian capital, resided there for a time with her son, King Alexander, enjoying the favor of the people; but in 1891, at the request of the National Assembly, left the country on account of political interests. Becoming reconciled to Milan in 1893, she resumed her former relations with the royal family; and returning to Belgrade in 1895, she was greeted by the people with every token of popularity. Her residence has since been chiefly in Biarritz, France; and after the assassination of King Alexander (1903) the political authorities at Belgrade decreed that she should not again enter the Servian kingdom.

Natato'res, an obsolete group of birds, the swimmers, artificially allied by Illiger on their likeness in pursuing an aquatic life, but structurally having relationships with several natural orders. Similar illogical groupings in the same by-gone but once popular classification were *Clamatores,* the screamers; *Scansores,* the climbers; *Cursores,* the runners; etc.

Natchez, năch'ĕz, Miss., city, county-seat of Adams County; on the Mississippi River, and on the Yazoo & M. V. and the New Orleans & N. R.R.'s; about 90 miles in direct line southwest of Jackson and 65 miles below Vicksburg. It has steamer connection with all the Mississippi River ports. The city is on a bluff about 200 feet above the river. On this bluff was located the first settlement, by Bienville, who built here Fort Rosalie in 1716. The place was destroyed and many of the inhabitants murdered, in 1729, by the Natchez Indians. The fort came into possession of the English in 1763, when the name was changed to Fort Parmure. In 1779 the Spaniards took possession, and in 1798 the United States became undisputed owner of lands east of the Mississippi, which included Natchez and much of the adjacent territory. From 1798 to 1820 Natchez was the capital of Mississippi; in 1803 it was incorporated as a city. During the Civil War the city suffered considerable loss of property and damage to its industries and commerce. In 1862 Commodore Porter shelled the city, and in 1863 Federal troops took possession and retained control until peace was declared. The country surrounding Natchez is chiefly devoted to agriculture; cotton is the principal product. The principal industries of the city are connected with the manufacturing and shipping of cotton products. It has ice factories, planing mills, foundries, machine-shops, and furniture factories. Natchez has a large trade in cotton, shipping each year thousands of bales. Considerable rice and sugarcane are shipped from this port. On a bluff just outside the city limits is a National cemetery, which contains 3,159 graves, 2,780 of unknown dead. The city has Memorial Park, Temple Opera House, a court-house, the city public buildings, Institute Hall, several excellent hotels, and a large number of handsome residences. It is the seat of Stanton College and Natchez Institute, and has good public and parish schools, and the Fisk Library. There are two orphanages and a number of private schools. The government, in accordance with the charter of 1877, is vested in a mayor, who holds office two years, and a council. The school board are elected by the council. Pop. (1890) 10,101; (1900) 12,210; (1910) 11,791.

Natchez Indians. See Creeks.

Natchez, nä-chāz, **Les,** a romance by Chateaubriand, published in 1825–6, many years after the author first planned it. The work was written during his exile in England, long after his journeyings in America, of which country it contains his views as well as setting forth his psychological speculations and philosophy of life. It is pervaded by the elements of that romanticism with which, through this and other works, the name of Chateaubriand (q.v.) is associated.

Natchitoches, năch-ĭ-tŏch'ĕz, an American Indian tribe formerly living along the banks of the Red River, in Louisiana. They were driven from their homes by the Natchez and united with the Caddoes in 1731.

Natchitoches, năk-ĭ-tŏsh', La., town, parish seat of Natchitoches Parish; on a short stream which flows into the Red River, and on the Texas & Pacific railroad; about 150 miles in direct line northwest of Baton Rouge, the capital of the State. The town is on the site of what was once a French trading post established in 1714. It is situated in an agricultural region in which the chief products are sugarcane and cotton. Considerable attention is given to stock-raising. The principal industries of the town are connected with the shipment of the agricultural products and live-stock. It is the seat of the State Normal School and of Saint Mary's Academy (R. C.); and it has a high school, public and parish elementary schools. Pop. (1890) 1,820; (1900) 2,388; (1910 est.) 2,600.

Na'than, Hebrew prophet in the time of David and Solomon. He was probably much younger than David, and lived late into the reign of Solomon. He was in his time the latest direct descendant and representative of the schools of the prophets under Samuel. Saint Jerome mentions a Jewish tradition which identifies him with the eighth son of Jesse, but there is no ground for this supposition. His earliest appearance in the history of David is as the King's counsellor, first advising the building of the temple and then after a vision announcing that the time had not yet come (about 1010 B.C.). His power, eloquence and tact as a prophet are shown by his exquisite apologue of the ewe lamb which brought David to a sense of his guilt in the case of Bathsheba (1000 B.C.). On the birth of Solomon the prophet named the child Jedidah, "beloved of the Lord," and was entrusted with his education. When the end of David's reign approached Nathan advocated the succession to Solomon, counseled Bathsheba to secure it, and rebuking the indifference of the King, obtained his presence and assistance at the inauguration of his successor (977 B.C.). Nathan's sons occupied high posts in the new court, Nabud being "the King's friend" and principal officer or chamberlain, while Azariah was over the "twelve officers which provided victuals for the King and his household." It was in accordance with the counsels and suggestions of this prophet that David, the year after his son's accession, crowned the work of his life, as poet, musician, and promoter of a rich temple ritual, by introducing into public worship an orchestra of Levites. Eccles. ix. 14–16, a passage attributed to Solomon, is evidently an imitation of 2 Sam. xii. 1–4, which shows how the influence of Nathan was perpetuated in the literature of succeeding ages. He left two works behind him, a life of Solomon and a life of David. He died about 935 B.C., and his grave is still pointed out at Halhul, five miles north of the ancient Hebron.

Nathan the Wise, a dramatic poem by Gotthold Ephraim Lessing, published in 1779. It expresses Lessing's ideal of the theatre as the pulpit of humanity and is concerned with the search for truth under all creeds, the protest of natural kinship against the artificial distinctions and divisions of mankind on religious grounds, and the elevation of brotherly love to the highest place in the Divine favor. The scene is in Jerusalem and the plot turns upon the fortunes of a certain Christian knight in wooing for his bride Recha, the supposed child of the Jew Nathan. Moses Mendelssohn, the friend of Lessing, is portrayed in the character of Nathan. Consult translation of 'Nathan the Wise,' by Ellen Frothingham (1868).

Nathan'ael, one of the earliest believers in and follower of Christ. He was a native of Cana in Galilee, and attached himself to Jesus on becoming convinced of the Messiahship of the son of Mary by his miraculous insight and power of reading the heart (Saint John i. 46–49). On the hypothesis that he was one of the twelve he has been identified with Bartholomew, but on insufficient grounds. There is a tradition that Nathanael was the bridegroom at the marriage at Caana, and Epiphanius implies that he was one of the two disciples whom Jesus overtook on the way to Emmaus.

Nat'ica, a genus of sea-snails, forming the type of the family *Naticidæ.* The shell is globose in form, the spiral portion being minute and indistinctly marked; smooth and porcelain-like, and its aperture of large size and semicircular form. The animal appears large in proportion to the shell, the foot especially being extensive. The mantle-lobes partly conceal the shell, and an operculum is always present. Most of the genera of this family are marine, and the white, chalky *N. heros* is a familiar species all along the eastern coast of the United States, and lays its eggs in a collar-shaped mass of glutinous material mixed with sand which often excites the curiosity of the stroller by the seaside. This shell is the one most frequently chosen by our hermit-crabs. Consult Arnold, 'The Sea-Beach at Ebb Tide' (1901).

Natick, nā'tĭk, Mass., town in Middlesex County; on the Charles River, and on the Boston & Albany railroad. The head of Cochituate Lake, one of the sources of the water supply of Boston, is in the northwest part of the town. The place was founded by John Eliot (q.v.), and from 1651 to the time of the founder's death, it was used chiefly as a home for converted Indians. In 1781 it was incorporated as a town. The chief manufactures are shirts, men's clothing, boots, shoes, edge tools, boxes, baseballs, and supplies for athletic games. A monument in honor of John Eliot is in one of the public parks and a soldiers' monument in another park. Some of the educational institutions are the Morse Institute, the Walnut Hill High School for young women, and the Bacon Public Library. Pop. (1900) 9,488; (1910) 9,866. Consult: Hurd, 'History of Middlesex County, Mass.'; Bacon, 'History of Natick.'

Nation, either a people inhabiting a certain extent of territory and united by common political institutions; or an aggregation of persons of the same ethnological family and speaking the same or cognate language. See GOVERNMENT.

National Academy of Design. See ACADEMY OF DESIGN, NATIONAL.

National Academy of Sciences. See ACADEMY OF SCIENCES, THE NATIONAL.

National Airs. See NATIONAL SONGS.

National Arts Club, organized in New York city, to promote acquaintance among art workers and art lovers, to provide proper exhibition facilities, and to encourage the publication of works on art. The club holds monthly exhibitions.

National Assembly. See ASSEMBLY, NATIONAL.

National Association for the Promotion of Social Science, a British institution designed to promote the increased cultivation of physical science and the facilitating of friendly intercourse among its followers. In addition, however, to the subjects relating to this branch of knowledge, a series of highly important questions bearing vitally on the well-being and prosperity of the country have largely engaged public attention of late years. They comprehend the science of social economy in all its branches, as regards public health and morality, education, crime, with its causes, prevention, and punishment, the mutual relations of employer and employed, and generally all those phases and laws which result from the social compact and develop themselves proportionately with the advancement of civilization and refinement. The project of establishing an association which should be specially devoted to the investigation and discussion of these topics was first suggested to Lord Brougham in the end of 1856. The first meeting was held in Birmingham in 1857, and meetings were subsequently held in London, Edinburgh, Glasgow, Dublin, Manchester, Liverpool, Newcastle, Aberdeen, Bristol, and other important towns. Many valuable and interesting papers were read at the meetings of the society, which published annually a volume of Transactions containing the most important reports, addresses, and papers.

National Association for the Study and Prevention of Tuberculosis, The, an organization composed of prominent American physicians who are especially interested in preventing the further spread of consumption. The headquarters are at 105 E. 22d St., New York.

National Association of Manufacturers, The. A convention, consisting of several hundred representative American manufacturers, met in Cincinnati, Ohio, 22 Jan. 1895, and provided for the organization of a national association of manufacturers. At the first annual convention of the association, held in Chicago 21 Jan. 1896, the name «The National Association of Manufacturers of the United States of America» was adopted, a preamble setting forth the objects of the association was published, and a constitution was adopted. The constitution, after careful revision, elaboration and emendation at the Pittsburg convention, 17–19 May 1904, states the objects of the association to be as follows:

> 1. The promotion of the industrial interests of the United States. This Association aims to give support and encouragement to policies and undertakings that will assist the industrial development of the country and increase the wealth-producing power of its people.
>
> 2. The fostering of domestic and foreign commerce as one of the means for the promotion of the nation's industries. The position of the Association in regard to commerce was well stated in the principles adopted at the first meeting of the Association in Cincinnati on January 22, 1895, as follows:
>
> "To the largest possible extent our home market should be retained and supplied by our own producers, and our foreign trade relations should be extended in every direction and manner consistent therewith."
>
> 3. The maintenance of individualism. The social and material welfare of all classes of the people is dependent upon the full exercise of individual freedom consistent with the equal rights of all and upon the perpetuation of the principle of personal ownership which furnishes the necessary incentive to individual effort and best promotes the conservation of capital, the great assistant of labor.
>
> 4. To better the relations between employer and employe consistent with fair dealing and with the fundamental principles of individual liberty and ownership in property guaranteed by the Constitution of the United States. This Association is opposed to discrimination in the employment of men by reason of membership or non-membership in any civil, political, religious, or fraternal organization. It is opposed to boycotts, black lists and all interferences with the constitutional rights of employer or employe. It is opposed to restriction of individual output, to limitation of the number of apprentices, and to all means and policies that tend to reduce the efficiency of the individual and the productive capacity of the nation.
>
> 5. To establish bureaus of international trade, publicity, organization and legislation to further the purposes of the Association. This Association seeks to accomplish its ends through public education and is opposed to all illegitimate methods in securing or preventing legislation at the hands of the lawmaking powers.

The membership consists of individuals, firms and corporations actually engaged in manufacturing. The executive officers, the president and the treasurer, are elected annually by ballot and the secretary is appointed annually by the executive committee. The executive committee consists of the president, the treasurer, the secretary, a vice-president from each of the 12 States having the largest recorded membership in the association upon election-day of its annual convention, and six members at large elected by the executive committee as thus constituted. The members, paying the same annual dues, $50, are exactly similar in voting power in the annual conventions, and the democracy of management is still further secured by the choice of vice-presidents by the different State delegations attending the annual convention.

A carefully prepared announcement of the association reads as follows:

«What it is and what it does»; Nine years old; its field the United States and the world; members 30 June 1902, 1,005; 30 June 1904, 3,040; a real association, perfectly co-operative and absolutely mutual; all members of equal voting power, each a unit; choose their own public policies, elect their own officers; spend the association's money and their own annual dues themselves; a business club of gentlemen, the general offices their headquarters; at 170 Broadway, meeting rooms, stenographers, messengers, telephones; for or against national and State legislation as convention or committee decides; co-operates with national, State and local associations; furnishes a Washington news service of value to individual members; protects members from improper taxation suits; helps them to straighten out their traffic difficulties; protects them against the advertising fakirs and the grafters; publishes 'American Industries,' most influential of manufacturers' papers (by this and other means makes effective the propaganda of the business interests); publishes the 'American Trade Index,' in English, French, German and Spanish; (a reference directory of members most valuable for foreign and domestic purchases); gives the best detailed facilities for developing export trade (including market reports, lists of buyers, credit reports and translations); publishes a 'Confidential Bulletin' of foreign inquiries for American goods; operates a freight and collection bureau for export shipments; intends that no member, whatever his requests, shall go away empty-handed; stands, in power for good, second only to the Department of Commerce; in educational and moral influence is something like a great industrial university.

The association is not an organization of one idea, but is perfectly free to take up at its annual meetings, or through the votes of its Executive Committee, whatever causes the members and its properly authorized officers conclude that it ought to take up. The association is also international in its scope, promoting and guarding the interests of its members, collectively and individually, in all parts of the world, especially by extending their export trade; and it is based upon the idea that however effective the general office and the executive officers may be, and ought to be, in the promotion of the interests of the whole organization, the success of such a body depends after all upon the hearty and continuing support which the members, whether collectively or individually, give to the association itself. MARSHALL CUSHING, *Secretary National Association of Manufacturers.*

National and International Councils of Women. The origin of the National Council of Women of the United States of America and of the International Council of Women dates back to the year 1886, when Mrs. Elizabeth Cady Stanton visited England and France and conceived the idea of an international association of women for the advocacy of women suffrage. At a suffrage meeting held in Liverpool 15 Nov. 1886, in honor of Mrs. Stanton and Miss Susan B. Anthony, the following resolution was unanimously adopted:

> Recognizing that union is strength, and that the time has come when women all over the world should unite in the just demand for their political enfranchisement, therefore,
>
> *Resolved,* That we do here appoint a Committee of Correspondence preparatory to forming an International Woman's Suffrage Association.

Upon their return to America, Mrs. Stanton and Miss Anthony pressed the consideration of this subject upon the leaders and it was decided to celebrate the fourth decade of the suffrage movement in the United States by convening an International Council. The date for this council was fixed for 25 March 1888 and it was at a preliminary meeting of duly accredited delegates to this council that Mrs. May Wright Sewall presented a plan for the organization of two permanent bodies, to be known as the National Council of Women of the United States, and the International Council of Women, to labor for the promotion of unity and mutual understanding among all associations of women working for the common welfare of the community. From Mrs. Sewall's plan, carefully elaborated, have been reared these magnificent structures, known the world over — the International Council of Women, and the score of National Councils of which it is composed.

Miss Frances Willard, who was one of the promoters of the movement, was elected as the first president of the National Council of Women of the United States, while Mrs. Fawcett of England became the first president of the International Council of Women, with Miss Clara Barton of the Red Cross Society as its vice-president. At the second triennial term of the National Council of Women of the United States, they chose for their motto, "Lead Kindly Light," suggested by M. Louise Thomas. When the council idea was first conceived, the main object was to establish a greater bond of sympathy among the women of different organizations in various countries, without regard to creed, party or any particular field of activity. They chose for their motto, the Golden Rule — "Do unto others as ye would that others should do unto you."

The fundamental principles of Councils of Women are to band women together for greater unity of thought, sympathy and purpose; and to form an organized movement of women that will best conserve the highest good of the family and the State, for the purpose of overthrowing all forms of ignorance and injustice, and for applying the Golden Rule to society, custom and law.

The results of the influence of the National and International Councils can scarcely be comprehended. They have collected and spread correct information regarding woman's opportunities, her work, its objects and its needs. They have been the medium through which women have been able to widen their knowledge and to increase their faith and charity by being brought into personal touch with other workers whom they otherwise might never have met and of whose specific work they would have had no knowledge. They have been able to assist municipal, State and national legislative bodies to accomplish a vast amount of good in the reform and passage of various laws relating to women, children and the home.

There are in the American Council of Women, about 20 national affiliated organizations and nine local councils, each one of the former representing a different line of work; in the International Council we have 19 national councils. Once in every five years the women of the various countries, united in the International Council, meet in quinquennial session for the purpose of advancing and promulgating ideas for combined effort, also to listen to the reports of the progress that has been made along the various lines of work by the affiliated societies. At the quinquennial session recently held in Berlin there were 65 official representatives and some 400 speakers from 19 councils, representing 6,000,000 women from 19 countries. The National Council of Women of the United States represents over 1,500,000 women, and includes many women of prominence and talent who are devoted to the ideas represented by the organization. LILLIAN M. HOLLISTER, *Treasurer.*

National Banking Act. See BANKS AND BANKING; FINANCE.

National Banking System. See BANKS AND BANKING; FINANCE.

National Banks. See BANKS AND BANKING.

National Board of Health, The, a Federal body, instituted by Act of Congress, 3 March 1879, to consist of 11 members; one army surgeon, one navy surgeon, one medical officer of the marine hospital service, one officer of the Department of Justice, and seven physicians from civil life. Industrial development had rendered all sections of the country interdependent in matters of health and wealth, and isolation was no longer possible. At the period of the passage of the Act of Congress there were only State and local systems of quarantine in existence in the United States, and Congress did not regard them as adequate to meet all the emergencies that had arisen or that might arise in the prevention of the introduction of contagious and infectious diseases from foreign countries. The Act was to establish a national quarantine system, with such regulations between State and local systems of quarantine and the national quarantine system as would secure harmony of action and would give a complete and effective system of quarantine to the United States. The national authority was required to secure: 1, International sanitary co-operation; 2, the collection and distribution of sanitary information; 3, the preparation of maritime sanitary regulations; 4, the enforcement of maritime sanitary inspections in foreign ports; 5, the erection and maintenance of refuge stations; 6, the aid of State authorities; 7, the organization of quarantine where none exists; 8, the power to add necessary rules to any deficient quarantine. Consult, Allen, 'Rise of the National Board of Health' (1899).

National Cemeteries are burial grounds, instituted by Act of Congress, for the interment of United States soldiers who have fallen in battle, and whose graves become, accordingly, a sacred national charge. These graves, 316,236 in number, are distributed in 72 special, or «National,» cemeteries, and in 320 of the local cemeteries of the country. The names of 175,764 (more than one half) of the dead have been preserved and attached to the graves. Of the rest it is only known that they died fighting in the Federal armies; their graves marked with the sad inscription, «Unknown United States Soldier.» Of the whole number, less than one fifth now repose in their original graves; 257,520, or more than four fifths, have been removed from the rude trenches of the battlefields, or from their roadside graves. The largest National cemetery in the country is at Vicksburg, Miss. About 17,000 are interred here. Near by is the cemetery at Natchez, where 3,200 are buried. In the immediate vicinity are the cemeteries of Port Hudson, Baton Rouge and Alexandria. A National cemetery that is very little known is Jefferson Barracks, located about 18 miles below Saint Louis, Mo. Over 11,800 are buried here, and the cemetery is one of the grandest sites in the world. It is about 300 feet above the Mississippi, on the west bank, and commands a view in all directions over the bottom lands. This cemetery is remarkably well kept, although it does not contain as many trees as one feels ought to be there. The National cemetery on the Custer battlefield in Dakota is perhaps the strangest burying-place in all the world. It is a most barren spot, containing an enormous marble shaft, with 414 graves grouped around it. The strange thing about this cemetery is that all those sleeping there were killed on the same day. It is not generally known, but the United States maintains a National cemetery at the City of Mexico. The 6,184 buried there are the victims of the Mexican war. For a complete list of National cemeteries see MILITARY POSTS, U. S.

National Christian League for the Promotion of Social Purity, an American organization with headquarters in New York, founded for the purpose its name implies. The league has established a home in New York for self-supporting women, and has organized an auxiliary known as the Social Culture Club, for the improvement of home life by influencing young mothers and girls. The work carried on by special committees aims distinctively at preventing the extension of vice by disseminating wholesome literature, supplying the physical needs of those who are being rescued from, or who are dangerously exposed to vice, and by establishing homes for working girls, where nominal rates only are charged. Annual conventions are held.

National Civic Federation, The, an American organization, founded 16 Dec. 1901; the outgrowth of a number of local conventions representing capital and labor. It is entirely non-partisan in principle, considering such topics as imperialism, trusts, tariff, taxation, etc., with a view of obtaining the clearest understanding of them. The Federation is controlled by an executive committee of 30 members and meets annually, or at such other times and in such localities as may be deemed advisable. Its membership consists of men from all parts of the country, including a large number prominent in the various occupations of life. The by-laws of the Federation provide the following standing committees: Foreign Relations, Insular Affairs, Banking and Currency, Industrial Combinations, Interstate and Foreign Commerce, Consular and Diplomatic Service, Military and Naval Affairs, Labor, Education, Immigration, Municipal Government, Taxation, Civil Service, Indian Affairs, and the Negro Question. The main success of the Federation so far has been in the adoption of means for the promotion of industrial peace; the establishment and maintenance of proper relations between employers and workers; the prevention of strikes and lockouts; the settlement of labor disputes before an acute stage has been reached; and where ruptures have occurred, in applying the best means for the restoration of friendly relations between both parties, no power of arbitration being assumed unless such power is conferred by both parties concerned in the dispute. Along these lines, the Federation has been instrumental in settling several strikes since its organization. See INDUSTRIAL COMMISSION.

National Conference of Charities and Correction, an American association composed of State boards of public charities and various charity organizations. The national conference is held each year in some city determined upon at a preceding meeting. At these conferences papers are read and general subjects embraced under charity and correction are discussed.

National Convention, in France, a legislative body constituted in the hall of the Tuileries, 17 September, and formally opened 21 Sept. 1792. The third assembly of the deputies elected by the French people after 1789, decreed the suspension of the king, 10 Aug. 1792, and voted the election of this National Convention. Its first act was to make France a republic by abolishing the throne, and this was followed by the trial and sentence to death of the king. Internal dissensions arose between the Jacobin or Montagnard Party and the Girondists, resulting in the overthrow of the latter. The Convention sent thousands of its political opponents to the guillotine, and the Reign of Terror under the dictatorship of Robespierre was followed by his downfall and the suppression of the Jacobins The convention then existed till a new constitution was organized, and the executive directory was installed at the Little Luxembourg, 1 Nov. 1795. The Chartists in England formed a National Convention in 1839. In the United States a National Convention is the meeting once in four years of a political party assembled to select a Presidential ticket. See ELECTIONS.

National Covenant, a league formed by Scotch Presbyterians in 1638. See COVENANT.

National Debt. See DEBT, NATIONAL.

National Divorce Reform League. See MARRIAGE AND DIVORCE.

National Education, Systems of. See Education in the United States; Educational Organization and Administration.

National Educational Association, an organization of teachers and educators in the United States, formed «to elevate the character and advance the interests of the profession of teaching and to promote the cause of popular education.» It was established in 1857 as the National Teachers' Association, and assumed the present name in 1870. Meetings have been held annually in the different States and in Canada, at which important educational questions have been discussed; and the 'Proceedings' (published annually) contain papers of great educational value and interest. Before 1870 all discussions were held before the whole association as a body, but since then various departments have been organized for the consideration of special topics, including normal school and kindergarten departments, and the national council of education, this latter, consisting of 60 members elected from the association, has published several important reports. A permanent endowment of about $155,000 has been secured; the active members of the association number over 6,000, and the associate members attending the annual meetings have averaged 10,000 for the past few years.

National Expansion is the acquisition of territory, whether by conquest, seizure, or purchase. Since the treaty of peace with Great Britain in 1783 the United States has expanded in area about five-fold. By the peace protocol signed by representatives of Spain and the United States, 12 Aug. 1898, it was provided that Porto Rico and other Spanish islands in the West Indies and an island in the Ladrones should be ceded to the United States, and that the latter should «occupy and hold the city, harbor, and bay of Manila pending the conclusion of a treaty of peace, which shall determine the control, disposition, and government of the Philippines.» By this treaty the Philippine Islands were ceded to the United States, the latter paying Spain $20,000,000. Subsequently the United States bought two other islands in the vicinity for $100,000. See Annexation; Colonies and Colonization.

National Farmers' Alliance. See Farmers' Alliance.

National Gallery, The, the British national picture gallery; a collection of paintings, in Trafalgar Square, London. It originated in a collection formed by Mr. Angerstein, consisting of 38 pictures, 29 by old masters and 9 by British painters, and purchased with public funds in 1824 for $280,000 as the nucleus of a national gallery. Since that time the collection has been greatly enlarged by purchases out of funds provided by Parliament, as well as by bequests and gifts. Of the latter the most munificent has been that of Mr. Vernon in 1847, a collection of 157 works of English painters. Another highly valuable section is that of the pictures and drawings by Turner bequeathed to the nation at his death in 1851. In 1871 a valuable prize was secured by the purchase for $375,000 of Sir Robert Peel's collection, consisting of 77 paintings and 18 drawings. In 1885 Parliament voted $350,000 for the purchase of a single picture, the 'Ansidei Raphael,' together with $87,500 for another, Van Dyck's 'Charles I. on Horseback.' The National Gallery now comprises fully 1,200 pictures, and though specially strong in examples of the British school of painting, foreign masters are fully represented. The various early and late Italian schools are extensively illustrated; there are good examples of the chief representatives of Italian art, as Raphael, Correggio, Paul Veronese. There are a few good examples of Murillo and Velasquez and the Spanish school; and the great Dutch and Flemish painters, Rembrandt, Rubens, Van Dyck, etc., are well represented.

National Geographical Society. See Geographical Society, National.

National Grange. See Grangers.

National Guard. See Militia.

National Hymns. A national hymn as usually understood is the official song rendered on ceremonial occasions, fêtes, and other public gatherings It is sometimes an air (without words) that is recognized by the government, a march played by bands and orchestras to stimulate patriotism and loyalty to the ruler. While the oldest of national hymns now extant date back less than five centuries, lines breathing the spirit of patriotism were written by Horace and other poets of ancient times. The national song is intimately related with, and probably grew out of, the folk-song. Words and music should convey something of the national temper, should voice the aspiration of a people, and express to some extent the ideas that a nation stands for. Love of fatherland and pride in one's country are the keynotes of many national anthems. In some of them religious feeling is blended with patriotic sentiment. The tune as well as the lyric should be by a native composer. In Europe the writers of national hymns have usually been enlisted in the service of institutionalism. Their productions have been often inspired by devotion to church and state, also by love of home. Considering the lack of poetical merit in most national songs, their influence has been very great. Wars and revolutions have sometimes called them into being, and in these especially the note of freedom is emphasized.

Austria.— The Austrian national hymn, 'Gott erhalte unsern Kaiser,' was written in 1797 by Laurence L. Haschka (1749–1827); music by Joseph Haydn (1732–1809). A stanza is quoted:

God preserve our Franz in glory, Franz our Emp'ror good and great!
High in wisdom, famed in story, we his praises celebrate;
Love of subjects young and hoary bind his crown of regal state,
God preserve our Franz in glory, Franz our Emp'ror good and great!

Hungary. Among the patriotic songs of Hungary the one most frequently heard is 'Isten áld meg a Magyart' (Lord, bless the Hungarian), which is wed to a striking melody. The renowned 'Rákótzy March' has even greater power over Hungarians. Bohemia, now included in the Austrian empire, has two well-known national songs, the 'War-song of the Hussites' (dating back to about 1460) and 'My Fatherland,' composed centuries ago. The names of author and composer are forgotten. The first stanza of this favorite national ditty is:

Where is my house? Where is my home?
Streams among the meadows creeping,

Brooks from rock to rock are leaping,
Everywhere bloom spring and flowers,
Within this paradise of ours;
There, 'tis there, the beauteous land!
Bohemia, my fatherland!

Belgium.— The Belgian national hymn is 'La Brabançonne' (the Song of the Brabantines); music by François van Campenhout (1780–1848). The words were written by Jenneval, a French comedian, who was playing in a theatre of Brussels when the rising took place which resulted in Belgium's independence from Dutch rule in 1830. The refrain plays on the word "orange," referring to the reigning house of Orange in the Netherlands. The first stanza is appended:

Who would have thought the arbitrary
  And scheming despot would bring force?
Against us comes a sanguinary
  Princeling, with shrapnel in his course.
'Tis done, o'er Belgians comes a change.
  No more with Nassau shameful pact shall be.
The grape-shot's shattered the orange
  Upon the tree of liberty.

Three other versions of 'La Brabançonne' were written — that by Lonlay in 1848, another by Campenhout, and one by Hymans in 1852 — relating to the political situation in those years.

France.— 'La Marseillaise' (first known as the 'War Song of the Army of the Rhine' and then as the 'Song of the Marseillais') is the greatest of all national hymns. It was composed in one night (24 April 1792) by a young artillery officer, Rouget de Lisle (1760–1836). Although the authorship of the air is in dispute, it has generally been considered his composition. It has also been attributed to Holtzmann and to Dalayzac (a noted French composer). The song gave articulate expression in the spirit of the Revolution and has been the inspiration of French armies on many a battlefield. The keynote of the 'Marseillaise' is in the final stanza (the sixth):

Oh love of fatherland supernal,
  Our avenging arms direct, sustain!
Oh Liberty, divine, eternal,
  Fight by thy champions' side amain!
Beneath our gallant banner gory,
  May victory hasten at thy call,
  And thine opponents, as they fall,
Behold thy triumph and our glory!

The national hymn of the Second Empire (1852–70) was 'Partant pour la Syrie'; words by A. de Laborde and music by Queen Hortense.

Great Britain.— The British national hymn, 'God Save the King,' was composed in 1739 by Henry Carey (1692–1743), who was partly indebted to others for the words. He borrowed and re-wrote the air from the French. The music has been adopted for the national hymns of the United States, Switzerland, Prussia, and other German states. The Welsh national song, 'Hen Wlad Fy Nhadan' (Land of my Fathers), was written by Evan James; melody by James James. The first stanza, as translated by Eben Vardd, is as follows:

The land of my fathers, the land of my choice,
The land in which poets and minstrels rejoice;
The land whose stern warriors were true to the core,
While bleeding for freedom of yore.

Among the patriotic songs of various parts of the British Empire are 'The Song of Australia' (words by Mrs. C. J. Carleton and music by Carl Linger) and Canada's 'Maple-leaf Forever' (music by A. Muir).

Germany.— Germany's national hymn, 'Die Wacht am Rhein' (The Watch on the Rhine), was written in 1840 by Max Schneckenburger (1819–49). The air, composed in 1854 by Carl Wilhelm (1815–75), was little known until the Franco-Prussian war (1870–1), when this stirring lyric sprang into sudden popularity.

A national song very popular among Germans is 'Deutschland über Alles,' written in 1841 by August H. Hoffmann (1798–1874), generally known as Hoffmann von Fallersleben. It is sung to the music of the Austrian national hymn. The first stanza of 'Das Lied der Deutschen' is thus translated:

German Empire over all things, over all things in the
  world,
When for safety and defiance its proud banner is
  unfurled,
From the Maas unto the Memel, from the Etsch to sea
  waves curled —
German Empire over all things, over all things in the
  world!

Prussia.— The Prussian national hymn is 'Heil dir im Siegerkranz' (Hail to thee laurel-crowned), written in 1790 by Heinrich Harries (1762–1802). It is sung to the tune of 'God Save the King.' A general favorite is 'Preussenlied' (Song of the Prussians), written in 1830 by Bernhard Thiersch (1794–1855); melody composed in 1839 by H. A. Neithardt (1793–1861). The Bavarian hymn is 'Heil unserm König, Heil' (Hail to our monarch, hail).

Switzerland.— The Swiss national hymn, 'Dem Vaterland' (My Fatherland), by J. R. Wyss (1781–1830), is sung to Carey's music. The first stanza of this inspiring lyric is:

Call'st thou, my Fatherland?
See us with heart and hand
  Vowed to thee, all!
Helvetia, hail to thee!
True still thy sons shall be,
Like them Saint James did see
  Leap at war's call!

Netherlands.— Holland has two national songs that are often sung on public occasions — 'Wilhelmus van Nassouwe' (dating back to 1583) and 'Wien Neerlandsch Bloed.' The latter hymn, by H. C. Tollens (1778–1856), begins:

Let him in whom old Dutch blood flows,
  Untainted, free and strong;
Whose heart for Prince and country glows,
  Now join us in our song;
Let him with us lift up his voice,
  And sing in patriot band,
The song at which all hearts rejoice,
  For Prince and Fatherland!

The writer of the Boer national hymn is not known. The music is attributed to the Dutch composer, Richard Holl. There are three stanzas, of which the first runs as follows:

Know'st thou a race, of freemen bred,
  Who broke the tyrant's might;
Who burst their bonds and fought and bled
  For freedom and for right?
Come, burghers! Raise the flag on high
  That led to victory;
The hour of bondage has gone by —
  Free men, free men are we!

There are two stanzas in the national hymn of the Orange Free State; words by H. A. L. Hammelsberg and music by W. F. G. Nicolai.

Denmark.— The Danish national hymn, 'Kong Christian stod ved höjen mast' (King Christian stood beside the mast), was written by Johannes Evald (1743–81); music by Johan Hartmann (d. 1793), a German who settled in Copenhagen in 1768. Longfellow's version of this spirited poem is well known.

Norway.— The Norwegian national hymn is 'Sang for Norge' (Song for Norway), written in 1859 by Björnstjerne Björnson. Three stanzas of this admirable lyric have been translated by Rasmus B. Anderson. The first is:

> Yes, we love with fond devotion
>   Norway's mountain domes,
> Rising, storm-lashed, o'er the ocean,
>   With their thousand homes;
> Love our country, while we're bending
>   Thoughts to fathers grand,
> And to saga-night that's sending
>   Dreams upon our land.

Another patriotic song is Anker Minding's 'Sönner af Norge' (Sons of Norway), set to music by H. A. Bjerregaard (1792–1842).

Sweden.— The Swedish national hymn is 'Fosterjorden' (Land of my Birth), by Richard Dybeck (1811–77); melody from Jemtland (a province in western Sweden) arranged by J. N. Ahlstrom. C. T. Hanson's translation is:

> Oh, ancient beloved Northland of my birth,
>   The happiest of nations though lowly,
> I greet thee, most beauteous land upon earth,
>   Thy green hills, thy sun, thy heaven blue and holy.
>
> The thought of thee brings back the days that are gone,
>   The same in thy royal beauty ever,
> O'er all lands and seas thy sweet name is borne,
>   Oh, I would live among thy hills forever!

Russia.— The national hymn of Finland, 'Värt Land' (Our Land), by J. L. Runeberg (1804–77), is one of marked beauty; music by F. Pacius. The Russian national hymn, 'Bozhe Zaria Chrany' (God preserve the Tzar), written by Joukowsky, is a prayer. The air by Alexis Lvoff dates from 1830, when Nicholas I. ordered it sung as the national anthem. The revolt of 1830 produced the stirring battle song by Albert Sowinski, 'Poland's not yet dead in slavery,' which has been called the Polish national hymn.

Rumania and Servia.— The Balkan states have national songs that are highly characteristic of these liberty-loving peoples. That of Montenegro is 'Onward! Onward!' Servia has two: 'Rise, Servians'; and 'God in His Goodness,' set to music by D. Jenko. In 1861 the Rumanian government offered a prize for the best national hymn, which was won by V. Alexandri's stanzas, 'Long live the king'; music by E. A. Hübsch.

Turkey.— Turkey has no national hymn. Each sultan has an imperial air composed in his honor. That of Abdul Hamid, 'Hamidie,' was written by Hadji Emin Bey; music by Redgeb Pacha. There are several Ottoman war songs full of national feeling.

Greece.— The Greek national hymn is the war song, 'Sons of Greece, come, arise,' which dates back to the days of the Greek struggle for independence (1821–9). Byron translated it.

Italy.— The only national air of Italy is Gabetti's 'Marcia Reale Italiana' (Royal Italian March), played on all official occasions. The famed Garibaldi's 'Hymn' is a martial strain, and the other patriotic songs are sectional.

Spain.— The Spanish national air is the fine 'Hymne de Riejo,' by Huerta (1803–80).

Portugal.— Portugal's national hymn is the 'Hymno Constitucional,' written about 1861 by Dom Pedro I., emperor of Brazil. Upon the accession of Don Carlos I. (21 Dec. 1889), a new national air was composed by H. M. Jurior.

United States.— The national anthem of the United States is the 'Star Spangled Banner,' written in 1814 by Francis S. Key. The melody is that of an old drinking song. Other patriotic songs that divide honors with it are: 'Hail, Columbia' (1798), by Joseph Hopkinson (1770–1842), sung to music composed by Fyles in 1788; and S. F. Smith's 'America,' written in 1832 to fit the air of 'God Save the King.'

Mexico.— The Mexican national hymn, 'Mexicanos, al grito de guerra' (Mexicans, at the cry of war), was written by F. G. Bocanegra; air composed in 1853 by James Nunó.

South and Central America.— The national hymns of other countries of Spanish America are: Costa Rica — 'De la Patria,' by M. M. Gutierrez; Guatemala — words by P. Molina and air by R. Alvarez; Honduras — music by L. Campos; Nicaragua — air by Blas Villatas; Salvador — words by J. J. Canas and music by J. Aberle; Argentina — air by V. Lopez; Brazil — words by Medeiros e Albuquerque and music by L. Miquez; Chile — air by Carnicer; Bolivia — words by J. I. de Sanjines and music by B. Vincenti; Uruguay — music by D. I. Deballi; Venezuela — words by V. Salias and music by J. Sandaeta.

Oriental.— The airs that do duty as national hymns in Persia, Burma, and other Oriental countries are not very elaborate. That of Japan consists of four lines:

> Let Mikado's empire stand
> Till a thousand years, ten thousand years shall roll,
> Till the sand in the brooklets grow to stone,
> And the moss these pebbles emeralds make.

The Japanese have borrowed G. F. Root's 'Battle Cry of Freedom.' Some Mohammedan countries of Africa have sultans' hymns. The national air of Liberia is by Olmstead Luca.

Consult: Smith, 'Music of the Waters'; Smith, 'Stories of Great National Songs'; Fitzgerald, 'Stories of Famous Songs'; Sousa, 'Airs of All Lands'; Kappey, 'Songs of Eastern Europe'; Engel, 'Study of National Music'; White, 'National Hymns.' EUGENE PARSONS.

National Law. See INTERNATIONAL LAW.

National Legislative Assembly, in French history, when the nobility and clergy summoned with the Tiers Etat ("Third Estate") to the States-General declined to sit with the Commons, these declaring, on 17 June 1789, that they represented 96 per cent of the nation, assumed the name of the National Legislative Assembly, though the name Constituent Assembly is more frequently employed. The second assembly convened from 1 Oct. 1791 to 21 Sept. 1792, and was followed by the National Convention. Its composition was democratic.

National Museum. See UNITED STATES NATIONAL MUSEUM.

National Nicknames, the collective name of a people or nation, usually originating with the people themselves. John Bull was first given to the people of Great Britain by John Arbuthnot in his 'Law is a Bottomless Pit.' He also gave the name Nicholas Frog to the Dutch and Jean Crapaud (toad) to the French people. John Chinaman is a popular name for the Chinese, Taffy for the Welsh; Jean Baptiste for the French Canadians, and Ivan Ivanovitch for the Russians.

In the United States the two popular national names are Brother Jonathan and Uncle Sam. The former was first used. Gen. Washington, on assuming command of the New England Revolutionary forces, was in great straits for arms and war material. The governor of Connecticut, Jonathan Trumbull, was a man of excellent judgment and an esteemed friend of Washington. In the emergency, Washington said, "We must consult Brother Jonathan." This expression was repeated on other difficult occasions, and became a convenient name for the whole people. The name Uncle Sam is an extension of the letters U. S. (United States), printed or stamped on the government property. It was first used in Troy, N. Y., in 1812, when certain goods purchased for the government and branded U. S., were officially inspected by Samuel Wilson, whose nickname was "Uncle Sam." The coincidence of initials suggested the application of this nickname to the government.

National Parks and Reservations, large tracts of public lands in the United States, reserved from settlement or residence, and which are retained, maintained, and improved by the Federal Government. These public parks include the Casa Grande Park in Arizona, 480 acres; the Yellowstone National Park in Montana and Wyoming, 2,142,720 acres; the Sequoia Park in California, 250 square miles; the Hot Springs Reservation, 912 acres; Yosemite National Park, in California, 1,512 square miles; General Grant Park in California, 4 square miles; and others. A detailed description of these National parks will be found under their respective titles. For a list of United States military reservations see MILITARY POSTS, UNITED STATES.

National Portrait Gallery, British, an institution that owes its origin to the zealous and enlightened efforts of Earl Stanhope. A board of trustees was appointed late in 1856, and by the end of the following year 23 portraits had been secured — some of them purchases and others gifts. The difficulty of the trustees is to guard against improper admissions in the way of donation, and therefore no donation can be accepted unless approved of by at least three-fourths of the trustees present at a meeting. At present the National Portrait Gallery contains over 1,500 portraits, under the varieties of paintings, busts, medallions, etc. Its treasures were for a time accommodated in the Bethnal Green Museum, but a new building, erected for it mainly by private munificence (funds being provided by W. H. Alexander), beside the National Gallery, was opened in 1896. The arrangement of the portrait is chronological, beginning with Richard II (1366–40). The large picture of the "Reform Parliament" hangs in the lower exhibition hall, while the portraits exhibited include representative works of Van Dyck, Gainsborough, Reynolds, Raeburn, Lawrence, Watts, and other great masters.

National Republican Party, in American history, the name taken by those who deserted the old Democratic-Republican party after the defeat of Adams by Jackson in 1828. Clay was defeated. In 1835 the party, reinforced by other elements, took the name of Whig. See WHIG PARTY.

National Road. See ROADS AND ROADWAYS.

National Soldiers' Homes. See SOLDIERS' HOMES.

National Songs, popular melodies or tunes with accompanying words, peculiar to a particular nation or people. These songs are sung and the melodies played on state or public occasions, and are frequently utilized in war as battle songs. In the United States, 'The Star Spangled Banner,' 'Yankee Doodle,' 'Hail Columbia,' 'America,' 'John Brown's Body,' and 'Dixie' are popular national songs. It is generally conceded that 'Yankee Doodle' is the true national American air, notwithstanding the more recent rival claims of 'Hail Columbia' and 'The Star Spangled Banner,' neither of which have high intrinsic merit or have taken any great popular hold. More like a hymn is the song 'America,' which is sung to the tune of 'God Save the King.' The origin of 'Yankee Doodle' is obscure and disputed. The most probable account ascribes to the tune an English origin, and the words to Dr. Schuckburgh, an army surgeon, about 1755, soon after which, during the American Revolution, it came extensively into vogue.

The origin of the British national anthem has been a subject of controversy since the end of the 18th century, and is still involved in obscurity. 'God Save the King' was first printed in the 'Harmonia Anglicana' of 1742, without name of author or composer, varying slightly from the present version; and in 1745, during the Scottish rebellion, it became widely known, versions of it being sung nightly at Drury Lane and Covent Garden theatres with great applause. Of the numerous claims to its parentage, the view supported by most, and by several eminent writers, attributes it, both words and music, to Henry Carey, about 1740. The evidence for this is given in Chappell's 'Popular Music of the Olden Time,' and Chrysander's 'Jahrbücher,' Vol. I. But W. H. Cummings, who thoroughly beat out the subject in a series of papers in the 'Musical Times' in 1878, entitled to the greatest weight, considers this evidence unreliable; and he arrives at the conclusion that the music has been adopted (but when, and by whom, we shall probably never know) from an "Ayre" by Dr. John Bull, found (without words) in a collection of music by him once in the hands of Dr. Kitchener, afterward of Richard Clark, the original of which seems to have disappeared.

The hymn was translated into German by Heinrich Harries, a Holstein clergyman, and sung to the original air at a birthday celebration in honor of the king of Denmark in 1790; and an adaptation from these words, made in 1793 by Dr. B. G. Schumacher, beginning "Heil dir im Siegerkranz," has ever since been in use as the Prussian national hymn. It called forth the admiration of Beethoven and Haydn, and moved the latter to compose the Austrian national hymn, which was first sung on the Emperor Franz's birthday in 1797. The words now used, beginning, "Gott erhalte Franz den Kaiser," are by Baron Zedlitz; the original words were by Hauschka. The Hungarians have two national hymns — the 'Szózat' ('The Appeal'), beginning, "Be true to the land of thy birth," written by Vörösmarty (1800–55), the creator of Hungarian poetry of the Romantic school, and composed by Benjamin Egressy, an actor and eminent composer of sacred music; and the 'Magyar Hymnusz,' written by Kölcsey and composed by Francis Erkel. The Rákóczy march, by an unknown composer, dates from the end of the 17th century. The simple and dignified Russian national anthem dates from 1830, and is the work of General Alexis Lwoff (1799–1870). Of the Danish national hymn, 'Kong Christian,' the words are by Ewald and the music by Johann Ernst Hartmann (1726–91). There are several claimants to the honor of being the Norwegian national hymn, of which may be mentioned ‹Sönner af Norge,› written about the beginning of the 19th century, music by C. Blom›; and the modern ‹Ja, vi elsker dette Landet (‹Yes, we love this land›), words by Björnson, music by R. Nordraak. The Swedish hymn ‹King Karl, the Young Hero,› was written by Esaias Tegnér (1782-1846). The Dutch national hymn, ‹Wien Neerlandsch Bloed,› was written by Henrik Tollens (1780–1856), and was composed by J. W. Wilms. ‹La Brabanconne,› the Belgian revolutionary song of 1830, was written by Jenneval, a Brussels actor, and composed by Campenhout. The ‹Marseillaise› (q.v.) of the French was written and composed in 1792 by Claude Joseph Rouget de Lisle (1760–1836), and received its name from being sung by the volunteers from Marseilles who took part in the movements in Paris in that year. Various doubts have been thrown on De Lisle's authorship of the tune, but these were finally disposed of by a pamphlet written by his nephew in 1865. The Portuguese ‹Hymono Constitucional› was composed by Dom Pedro I., emperor of Brazil.

National Woman's Christian Temperance Union. See Woman's Christian Temperance Union.

National Union, an American fraternal and beneficial organization, incorporated in 1881, under the laws of Ohio. In 1910 there were 861 councils and 64,571 members in the Order. Over $150,000,000 in insurance is carried by the members, and over $31,900,000 has been paid out in death benefits. The headquarters of the Order are located at Toledo, Ohio.

National University, The, a proposed great institution of learning to be located at Washington, D. C. For over 100 years there has been discussion of this subject. The establishment of such a university was first conceived by George Washington about 1790, when the shares he received from the Potomac Company had proved so valuable. He wished to appropriate this stock toward the founding of such an institution, but this stock, and that accruing from the James River Company left by his will for such purposes, were, however, divided between two charity schools, one on the James (see Washington and Lee University), and one on the Potomac. Washington strongly disapproved of foreign education for the American youth

National Workshops. See Ateliers Nationaux.

Nationalism, a system of socialism having its origin in Edward Bellamy's novel of social reform, ‹Looking Backward.› In 1889 a party of Bellamy's admirers in Boston organized the first Nationalistic Association, and in 1901 the movement had spread so rapidly that nearly 200 similar clubs had been organized. In certain localities, particularly in California, these clubs took an active interest in politics. The movement also spread to England, where the Nationalization Society was organized in 1890. Bellamy's scheme involved government control of production and distribution. Consult Bellamy, ‹Looking Backward› (1887).

Nationalism, New. A phrase used by Theodore Roosevelt in speeches delivered during his tour through the West, from 23 Aug. to 11 Sept. 1910. He defined it thus: «The New Nationalism puts the national need before sectional or personal advantage. It is impatient of the utter confusion that results from local legislatures attempting to treat national issues as local issues. It is still more impatient of the impotence which springs from the over-division of governmental powers, the impotence which make it possible for local selfishness or for legal cunning, lured by wealthy special interests, to bring national activities to a deadlock. . . . «This New Nationalism regards the executive power as the steward of the public welfare. It demands of the judiciary that it shall be interested primarily in human welfare rather than in property, just as it demands that the representative body shall represent all the people, rather than any one class or section of the people.»

Lyman Abbot, commenting on New Nationalism in *The Outlook,* of which he is editor, and of which Theodore Roosevelt is contributing editor, referred to it as a continuation of an historical process involving a succession of extensions of national power. «Its latest development,» he states, «is two-fold: The right of the people to exercise, through the proper officials, such a strict supervision as will make the highways of the nation open to the use of all the people on equal terms, and the right of the people to keep the ownership and the control of such mineral and forest lands and water power sites as now belong to them, that they may not gall under the control of private and unregulated monopoly . . .»

Nationalist, in British politics, a term applied to the Irish political party whose programme includes the more or less complete separation of Ireland from Great Britain.

Nationality, in the United States is determined by the Federal law. The Constitution established no rules regarding the acquisition or loss of American nationality, which is therefore governed by the subsidiary or common law of the land. See Fourteenth Amendment; Government; Naturalization.

Nations, Battle of the («Völkerschlacht»), in the Napoleonic wars, the battle fought at Leipsic 16–19 Oct. 1813, in which Napoleon, with about 190,000 men, was defeated by the allies numbering from 200,000 to over 300,000 at different stages of the conflict. The French loss is estimated at 40,000 killed and wounded, and 30,000 prisoners; that of the allies at 45,000 killed and wounded. The liberation of Germany is practically dated from this event.

Nations, Law of. See International Law.

Native Bear, the Australian koala (q.v.).

Native Companion, an Australian name for a large local crane (*Grus australasiana*) peculiar to that island-continent.

Nativism. This is a term loosely applied in philosophy to views which, in contradiction to Empericesm (q.v.), hold that certain elements of experience are inborn and not acquired. Our knowledge of necessary truths, for instance, «Things equal to the same thing are equal to each other,» is an example.

Nativity, in astrology, the theme or figure of the heavens, and particularly of the 12 houses, at the moment when a person is born, supposed to indicate his future destinies, and synonymous with horoscope. See Horoscope; Astrology.

Nato'lia, or **Anato'lia**, the modern name for Asia Minor (q.v.).

Natorp, nä'tôrp, **Paul Gerhard**, German scholar: b. Düsseldorf, Germany, 24 Jan. 1854. He was educated in Berlin, Bonn, and Strasburg and accepted a professorship in Marburg in 1885. He wrote: ‘Descartes’ Erkenntnisstheorie’ (1882); ‘Platos Staat’ (1895); ‘Platos Ideenlehre’ (1903); etc.

Natrocal'cite. See Gay-Lussite.

Nat'rolite (from "natron," native carbonate of sodium), a native hydrous silicate of sodium and aluminum, having the chemical formula $Na_2Al_2Si_3O_{10} + 2H_2O$, and crystallizing in slender prismatic forms belonging to the orthorhombic system. It is transparent to translucent, and usually white (or nearly so), with a vitreous lustre, a hardness of from 5 to 5.5, and a specific gravity of from 2.20 to 2.25. It occurs in cavities in basaltic rocks, and in seams in granite, gneiss and syenite. It occurs in many parts of Europe, and fine crystals are found in southern Norway. In the United States the mineral occurs in Connecticut, New Jersey, and Arkansas, and also in the Lake Superior region. It is likewise found in Nova Scotia. Natrolite takes a good polish, and has been used as a gem stone.

Na'tron, a carbonate of soda or mineral alkali, $Na_2CO_3 10H_2O$. It is produced from the ashes of several species of marine plants, and is also obtained by evaporating the waters from some mineral springs. It occurs in nature, but only in solution, and is generally found in an impure state, being mixed with other sodium salts, such as the sulphate and chloride. The soda lakes of Egypt have supplied great quantities of this substance for many centuries; it was used by the ancient Egyptians as an important ingredient in their embalming fluids. A similar but impure hydrogen sodium carbonate is found deposited by evaporation on the shores of the Caspian and Black seas, also on the banks of alkali lakes and springs in California, particularly in the neighborhood of San Bernardino.

Natter, Heinrich, Austrian sculptor: b. Graun, Tyrol, 16 March 1846; d. Vienna 13 April 1892. He was five years apprentice to a sculptor in Meran and subsequently was taught drawing at Augsburg by Johann Geyer, a famous painter of humorous genre. Subsequently he studied with great profit under Max Widumann (q.v.), the sculptor, in the Munich academy. Weak health compelled him to travel and he visited Riva on Lagò de Garda, and Venice, until the war of 1866 called him to active military service. He afterward took up his residence at Munich, where he made his reputation by his portrait busts, sepulchral statues, a colossal statue of the god ‘Odin’ (1873) and the head of a ‘Sleeping Satyr.’ A career of wider activity opened for him after his settlement in Vienna, where, besides numerous bust portraits and monuments he executed the statue of Zwingli for Zürich; the statue of Haydn for Vienna; the portrait statue of Laube and Dingelstedt for the municipal theatre of that city; and the statue of Walter von der Vogelweide for Bolzano (1889). His statue of Andreas Hofer, which is his masterpiece, was unveiled after the sculptor's death on a height near Innsbruck. A poetic delicacy of conception and a certain lifelike expression, oftener found in painting than in sculpture, are the characteristic features of his work. His literary remains were published by L. Speidel, under the title ‘Kleine Schriften’ (1893).

Nat'terjack, an Old World toad (*Bufo calamita*), light-brown in color, spotted with patches of a darker hue. It does not leap or crawl like the common toad, but rather runs, whence it has the name of walking or running toad. It has a deep and hollow voice, audible at a great distance, and is often found in dry situations.

Nattier, Jean Marc, zhŏn märk nä-tē-ā, French painter: b. Paris 1685; d. 1766. He was the pupil of Jean Jouvenet, won the Academy prize in 1700 and became professor of the Academy in 1752. His fame as a portrait painter was increased by the visit he paid to Antwerp in 1715 to paint likenesses of Peter the Great and his wife Katharine I.; he also painted the portraits of many of their suite. So great was his skill in portraying the fine ladies of his day that he has done as much to immortalize such faces as those of Marie Lesczynska, Henriette de France, Madame Adelaide, Madame de Chateauroux, Madame de Flavacourt, and many others of the court of Louis XV., as Rigaud (see Rigaud, Hyacinthe) had done for Bossuet, for Louis XIV., his courtiers, and other leading men of the period.

Natty Bumppo, the central figure in Cooper's (see Cooper, J. F.) stories: ‘The Pioneers’ (1823), in which he appears as "Leather-stocking," a name lent to the series as the ‘Leatherstocking Tales’; ‘The Last of the Mohicans’ (1826), in which he is known as "Hawkeye" and "Le Longue Carabine" ("The Long Rifle"); and ‘The Pathfinder’ (1840) and ‘The Deerslayer’ (1841), in which his respective sobriquets furnish the titles of the volumes. Lounsbury (‘Life’ of Cooper 1884) has called him "one of the few original characters, perhaps the only great original character, that American fiction has added to the literature of the world."

Natuna (nä too'nä) **Islands**, East Indies, a chain of islands in the South China Sea, extending northwest from Cape Api, Borneo, and belonging to the Dutch. The principal islands are Great and South Natuna islands, and Stokong. The aggregate area is estimated at over 800 square miles. The islands are mountainous and densely forested; the chief products are cocoanuts, fish, rice, and maize. Pop. 9,000, mostly Malay fishermen.

Natural (in music). See Music.

Natural Bridges are formation tunnels eaten through rocks by streams, etc. There are many of these natural curiosities in the United States. The one in Virginia is the most celebrated. The arch is 60 feet spring, depth 200 feet, crown 40 feet thick. In Walker County, Ala., is a natural bridge in which the stone is so stratified as to resemble masonry. In Trinity County, Cal., a small river runs for 3,000 feet through an arch of 80 feet span and 20 feet high. In Berkshire County, Mass., the Hudson brook flows for 30 rods under an arch of white marble. At the village of Natural Bridge, N. Y., the Indian River flows through a series of arches.

Natural Gas. See Gas, Natural.

Natural History, in its widest sense, that department of knowledge which comprehends the sciences of zoology and botany, chemistry, natural philosophy or physics, geology, palæontology, and mineralogy. It is now, however, commonly used to denote collectively the sciences of botany and zoology, and it is sometimes restricted to denote the science of zoology alone.

Natural History of Selborne, The, a celebrated work by Gilbert White (q.v.), published in 1789. Its material consists of White's letters to Daines Barrington and Thomas Pennant (qq.v.), in which the writer describes outdoor life in the little Hampshire village which his works made famous and interesting alike to students of nature and to lovers of good books, among which the 'Natural History' ranks as a unique classic of science and of letters.

Natural Law. See Law, Natural.

Natural Philosophy. See Physics.

Natural Rights. See Law, Natural.

Natural Selection, the doctrine advanced by Charles Darwin and almost coincidentally by Alfred Russel Wallace (q.v.), to account for the divergence of animal forms and their gradual separation into distinct species and groups, by a process akin to the selective mating practised by men in rearing and perpetuating breeds of domestic animals. It forms the basis of Darwin's hypothesis of organic development by descent, and depends upon the fact that variations constantly appear in animals, and may in some degree be perpetuated. These variations may be minute fluctuations on either side of a mean, a little more of one character and a little less of another; or they may be sudden steps of considerable magnitude; in other words, they may be continuous or discontinuous. They may visibly affect only one character at a time, or they may affect many parts of the organism at once, as if there were a general movement to a new position of organic equilibrium.

(2) Living creatures are involved in a manifold and intricate struggle for existence, varying greatly in its form and in its intensity, and due to a variety of causes. It is necessitated especially by two facts: first, that two parents usually produce many more than a pair of offspring, and that the population tends to outrun the means of subsistence; and, secondly, that organisms are at the best only relatively well adapted to the external conditions of their life, which moreover are variable. The "struggle" may be for food or foothold, for mates or property, for self-preservation or for the welfare of the young, including much more than an internecine scramble around the platter which contains the necessaries of life; the phrase is applicable as regards relative length of life, vigor or constitution, success in having offspring, and so on.

(3) In this struggle for existence the relatively less fit organisms are weeded out or eliminated, and sometimes only a small proportion of those born survive to become adults or reproductive. But it must be clearly understood that elimination does not necessarily involve sudden death or no offspring; it may simply involve, in the first instance, a slightly shorter, less successful life, or a smaller, less vigorous family. Yet whether the eliminative process be gentle or severe, the result is the same — that the relatively more fit variants tend to survive; and since many variations are demonstrably transmissible from generation to generation, and may, through the pairing of similar or suitable mates, or in other ways, gradually increase in amount, the eliminative or selective process works toward the establishment of new adaptations and new species.

The three steps in the argument are thus: (1) The occurrence of transmissible germinal variations is a fact of life; (2) the struggle for existence is a fact of life; and (3) the elimination of the relatively less fit is a fact of life. The result has been, and is, the rise and progress of new adaptations, new varieties, new species, new types.

A formidable objection to the selection theory, first clearly stated by Prof. Fleeming Jenkin, is that variations of small amount and sparse occurrence would tend to be swamped out by intercrossing. In human or "artificial" selection, the breeder takes measures to prevent this by pairing similar or suitable forms, but what in nature corresponds to this action of the breeder? Various suggestions have been made in answer to this objection. Thus Weismann says: "The necessary variations from which transformations arise must in all cases be exhibited, over and over again, by many individuals," and in his ingenious theory of Germinal Selection he has suggested the internal mechanism by which this result may come about.

But the answer at present most relied on is that worked out by Romanes, Gulick, and others — the theory of isolation (q.v.). The theory of isolation emphasizes the great variety of ways in which, in the ordinary course of nature, the range of intercrossing may be restricted, for example, by geographical barriers, by differences in habit, by psychical likes and dislikes, and by those remarkable reproductive variations which cause mutual sterility between two sections of a species living on a common area.

We have given a statement of the theory of natural selection very much as it might have been given in 1859, when Charles Darwin and Alfred Russel Wallace enriched biology by their independent exposition of the selection idea; but since then our knowledge of the nature and origin of variations has greatly increased, the analysis of the various modes of inheritance has become much more precise, the difficulty of proving any instance of the transmission of "an acquired character" or direct somatic modification is generally acknowledged, and we have recognized the value of a second directive factor in evolution, namely, isolation. It may be said that the theory of natural selection is now being subjected to more severe and more dispassionate criticism than it had to encounter in the early Darwinian days, when the validity of the general evolution idea was the central subject of discussion.

Thus there is a demand for some serious attempt to measure the intensity of the struggle for existence in typical cases, and for evidence that the absence of a particular variation in certain members of a stock does really determine their elimination. In other words, evolutionists have awakened to the necessity of testing natural selection in relation to actual cases.

Lastly it should be noted that the doctrines of Lamarck, which were that use-and-disuse, inheritance of acquired characters, and other factors were more potent than natural selection, have been revived and strengthened by a school of naturalists who insist that they must at least be held to have had an important share in the phenomena of biology.

Bibliography.—Darwin, 'Origin of Species' (6th edition, 1882); 'Descent of Man' and other works; Wallace, 'Natural Selection' (1869; revised edition 1891) 'Darwinism' (1889); Huxley, 'Lectures on Evolution' and other works; Gray, 'Darwiniana' (1876); Weismann, 'Essays upon Heredity' (1892) and other works; Romanes, 'Darwin and After Darwin' (1892–5); Osborn, 'From the Greeks to Darwin' (1894), and the writings of Allen, Bates, Bateson, Beddard, Belt, Brooks, Cope, Forbes, Gadow, Haeckel, Hyatt, Lankester, Morgan, Packard, Poulton, Semper, and modern zoologists generally. See DARWINIAN THEORY; EVOLUTION.

Natural Theology, that knowledge of God's existence and nature which mankind learn from observation of the world of nature. Biblical theology is the knowledge of God's nature and operations derived from revelation; and revelation is impossible unless we first postulate a personal God. Thus natural theology is the foundation of any system which professes to give an account of the Supreme Being as well as of man's origin and destiny.

Method of Natural Theology.— The first proposition postulated in this department of speculation is that every effect requires a cause (q.v.). One of the self-contradictions of Lucretius is contained in his axiom *ex nihilo nihil fit* («nothing can come from nothing»), after pronouncing which he proceeds in his attempt to prove that the order and uniformity of nature proceeds from nothing, that is, random disorder, the fortuitous concourse of atoms. Unless it is admitted that certain events and phenomena are invariably connected as cause and effect, there can be no science of Natural Theology, which is based upon the assumption that causation is a fact, the truth of which is accepted among the intuitive beliefs of the human mind.

How far a Science.—As Natural Theology claims for its domain the physical, intellectual and moral nature of man as well as the world of nature in the midst of which he is set, it starts out by saying with Natural Science that the present constitution of things had a beginning. Plants and animals did not always exist on this planet. The questions arise, Whence did they come? How came man here? The theory that species as it exists at present was the original form of organic life on the earth, has now been abandoned, and two other theories have come in sight, (1) That animals and plants have been produced by forces eternally and necessarily inherent in matter (see NATURALISM). (2) That nature is the product of a personal being, acting with deliberate design. In the history of recent speculation we come upon a suspensive judgment in this question; on the other hand Positivists (see POSITIVISM) have ruled it out from the field of human speculation. Suspensive reasoners do not profess to know because they declare the matter unknowable. This is agnosticism (q.v.) and its adherents style themselves agnostics. On the other hand, observers of nature have remarked in the works of nature an analogy with and a resemblance to the works, contrivances and methods of human artificers. They have accordingly reached a belief in a transcendently great and powerful maker who has originated all things. The existence of man as an individual person has been taken as testimony to the existence of an infinite and eternal being as the one supreme God. It has also been averred that anti-intuitionalists destroy the basis of all knowledge and science and that a physicist who denies causation sweeps away the foundation on which his system is reared.

Main Arguments.—(1) It is claimed that the idea of God's existence is innate in every human being and is as necessary a fact of consciousness as his own personal identity. In the most rudimentary and debased tribes is found this sense of a Supernatural Power. Lubbock and others deny to some degraded races this innate idea; it is sometimes added that deaf-mutes are in the same mental condition. It does not, however, follow because an idea has not been expressed in language that it is therefore not present in the mind. The mind may not have been explored by the subject; the readiness with which belief in the supernatural is accepted by savages and children is one reason for the belief that the response they make to communications on this subject springs from previous divinations of the consciousness in realizing itself. If this idea is not innate it is certain that the faculties of the human mind are such that the study of nature, man, and the obligations of life bring each individual face to face with the notion of God. Descartes, Leibnitz and others aver that the capacity of the human mind to entertain the conception of a being perfect and omnipotent, proves the existence of a reality which corresponds to such a conception; but their argument has not satisfied metaphysicians such as Reid and Stewart and, through the metaphysical subtilities involved in it, must be laid aside as a popular argument. (1) The study of nature and of history, that is, of man as a physical intellectual and moral being, furnishes material for arguments from design, teleological arguments as they are sometimes called (see TELEOLOGY). This is the simplest and most obvious form of argument to be put forth in Natural Theology and has been put forth in all ages. Socrates constantly stated it; Cicero enforced it among his Roman followers. Although on the first publication of Darwin's and Wallace's theory of evolution it lost its place of importance in Apologetics, it has recently been revived and stated with renewed force. The laws of Natural Selection and Survival of the Fittest must have had a law-giver, and the discovery of additional links in the chain of causation does not necessarily destroy its continuity. The Hebrew writers constantly refer to the power and goodness of Jehovah as evidences both in the works of nature, the events of history and the faculties of mankind. Saint Paul begins his Epistle to the Romans with this argument against the degraded paganism of Rome; the Fathers have enforced it over and over again. Paley's 'Natural Theology' has been a most important statement of the argument from design which has been enlarged in its application by Chalmers, Tulloch, McCosh and Agassiz. The argument from design can of course only prove the existence of a creator of the world. Man alone is conscious of a Creator, who, however, need not be the self-existent God, but once grant that man has a maker, and it would at once follow that a supreme self-existent God exists who is the First Cause. Consult: Xenophon, 'Memorabilia'; Plato, 'Laws X.'; Cicero, 'De Natura Deorum'; Descartes, 'Principia Philosophiæ'; Leibnitz, 'Theodice'; Paley, 'Natural Theology'; Chalmers, 'Natural Theology'; McCosh and Dickie, 'Typical Forms in Nature'; Tulloch, 'Theism'; Chadbourne, 'Final Causes'; Harris, 'Philosophical Basis of Theism.'

Natural Tones are tones produced by the natural alteration of nodal points in wind instruments by pressure only. See Harmonics.

Naturalism, a term which, in the history of philosophical thought, has received a variety of meanings. In general it refers to that which is in accordance with nature. But the sense in which the term nature may be used is not by any means a constant but a variable, and as this sense varies we will find a set of corresponding meanings for naturalism itself. Nature may be considered as that which is the opposite of the artificial, the conventional or the traditional. Regarding nature from this point of view, the term naturalism will be employed in much the same sense as that in which Rousseau used it in his plea for a return to nature in matters philosophical, religious and political. Or nature may be regarded as the external reality which furnishes the material of all our sensations; naturalism will then signify in the Lockeian sense that which is original and fundamental in knowledge as opposed to that which is the result of the operations of the human understanding. Again, nature may signify the basis of natural affections and dispositions as opposed to the fundamental principles of conduct which are revealed in the "dry light of reason." In this sense Shaftesbury uses nature and naturalism in contrast to the rationalistic ethic of his day. Naturalism also has been used as a term to characterize such a philosophical system as that of Giordano Bruno, which identifies God with nature, and does not distinguish between the Creator and his works. In the midst of this confusion of meanings, however, the present day discussions in philosophy have established a determinate usage which for the most part is uniformly recognized, and consistently employed. This usage is quite different from any of the phases which have been mentioned, and may be defined somewhat as follows: Naturalism signifies a method of interpreting the subject matter of philosophy, which insists that all phenomena whatsoever are to be explained according to the laws of nature, that efficient causes only are to be regarded, while all considerations of final causes are to be rigorously excluded, as well as those alleged ideal implications of reason which posit some metaphysical necessity as a mode of interpreting physical phenomena.

In this sense naturalism, as regards psychology, grounds all psychical phenomena upon a purely sensationalistic basis; there is no self in the sense of an organizing power and unitary centre in the midst of the various states of consciousness; the spiritual elements of consciousness are regarded as incidental, and determined at the last analysis by the cosmic processes. As a theory of knowledge, there is no place for an idealistic construction of the data of experience. In ethics, naturalism is a science of what is and not of what ought to be. It allows a science of ethics but not a metaphysic. Its cosmology essays an explanation of the universe in terms of the laws of nature which inductive research may have discovered, but it has no concern or interest as to the question whether "through the ages one increasing purpose runs."

A system of naturalism, however, is not necessarily a philosophy of materialism any more than it is necessarily pantheistic, although it must be acknowledged that naturalism and materialism are often used as synonymous terms. It is not used in the present day as a term opposed to supernaturalism, as it is essentially a philosophical term and not used in a theological sense. It does not deny a supernatural reality in the theological sense; it is merely not interested in the questions which turn upon a beyond and above as regards human thought and human activity.

The antithesis which the term naturalism suggests does not lie in this direction. To understand the significance of naturalism, and it must be understood in order to appreciate in any adequate measure the philosophical problems of the day, the exact antithesis which it implies must be clearly apprehended. The antithesis is between an explanation of the phenomena of existence which can be expressed solely in terms of the laws of nature, and all explanations on the other hand which involve fundamental thought necessities as essential factors. The antithesis is between the natural and the rational, between the natural and the spiritual. This usage of the term we find in such a book as that of Balfour's 'Grounds of Belief,' or in Ward's 'Agnosticism and Naturalism,' or in Sorley's 'Ethics of Naturalism.' When Mr. Balfour's book was first published he was severely criticised in some quarters for his use of the term naturalism. This evoked much discussion, which has served to establish a definite and determinate sense in which the term may be used. A most able and satisfactory defense of Mr. Balfour's usage of the term is to be found in the work of Prof. Andrew Seth, entitled 'Man's Place in the Cosmos.' One of the essays is 'The Use of the Term Naturalism,' and it is one of the best discussions to which any student of the subject can be referred. Without doubt, the element of variability which has attended the history of this term has been to a large extent, if not altogether, removed, and a constant significance has resulted which conforms to the general usage of the present time; and the significance is the one which it has been the endeavor of this article to present.

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Naturalism (in Literature). See Realism and Naturalism.

Naturalists, American Society of, an association numbering 230 active members, organized in 1883, for the purpose of bringing together persons interested in topics of natural history.

Naturalization, the act of renouncing allegiance to one government and acquiring the rights of citizenship under another. Only in rare instances are the rights of the naturalized person equal in all respects to those of the native-born citizen; thus in the United States, while the civil rights are the same, the Constitution excludes the naturalized citizen from the offices of President and Vice-President. The act of becoming naturalized, however, does not abrogate the claims of the government under which the person concerned had previously lived and which were operative at the time such person changed his allegiance, especially in the case of attempts to avoid compulsory service in the army of the native country, and the laws of the United States do not afford protection for aliens who simply become citizens of this country for the purpose of escaping such service. The laws have been made so as to avoid as far as possible any conflict in this regard with other countries, and also to conform with foreign laws with regard to the required time of residence.

The majority of treaties with other countries call for a continuous residence of five years before admission, the notable exception being Great Britain, with whom the treaty allows of interexchange of citizenship with no stated period of residence. Treaties of this nature were negotiated with the North German confederation, and also with Bavaria, in 1862, but the Bavarian treaty will not allow of natives, who have emigrated to other countries before serving the required time in the army, again becoming permanent residents until they are 32 years of age; but if a certificate of immigration be granted, by the terms of this treaty, naturalization does away with the military obligation. Such treaties were also made in 1868 with Baden, Belgium, Bavaria, Hesse, Mexico, the North German confederation, and Würtemburg; in 1869 with Sweden and Norway; in 1870 with Austria and Great Britain; and in 1872 with Denmark.

In the United States, Congress holds exclusive power over the naturalization of citizens, and the power cannot be exercised by the individual States, but this does not prohibit the State from granting the rights and privileges of State citizenship, such as voting at State elections, holding offices, etc. See NATURALIZATION LAWS.

Naturalization Laws, acts placing foreign-born persons in the same legal position as natural-born citizens. The conditions under and the manner in which an alien may be admitted to become a citizen of the United States are prescribed by the U. S. Revised Statutes.

Declaration of Intentions.—The alien must declare upon oath before a circuit or district court of the United States or a district or supreme court of the Territories, or a court of record of any of the States having common law jurisdiction and a seal and clerk, two years at least prior to his admission, that it is, *bona fide*, his intention to become a citizen of the United States, and to renounce forever all allegiance and fidelity to any foreign prince or state, and particularly to the one of which he may be at the time a citizen or subject.

Oath on Application for Admission.—He must at the time of his application to be admitted declare on oath, before some one of the courts above specified, "that he will support the Constitution of the United States, and that he absolutely and entirely renounces and abjures all allegiance and fidelity to every foreign prince, potentate, state, or sovereignty, and particularly, by name, to the prince, potentate, state, or sovereignty of which he was before a citizen or subject," which proceedings must be recorded by the clerk of the court.

Conditions for Citizenship.—If it shall appear to the satisfaction of the court to which the alien has applied that he has made a declaration to become a citizen two years before applying for final papers, and has resided continuously within the United States for at least five years, and within the State or Territory where such court is at the time held one year at least; and that during that time "he has behaved as a man of good moral character, attached to the principles of the Constitution of the United States, and well disposed to the good order and happiness of the same," he will be admitted to citizenship.

Titles of Nobility.—If the applicant has borne any hereditary title or order of nobility he must make an express renunciation of the same at the time of his application.

Soldiers.—Any alien of the age of 21 years and upward who has been in the armies of the United States, and has been honorably discharged therefrom, may become a citizen on his petition, without any previous declaration of intention, provided that he has resided in the United States at least one year previous to his application, and is of good moral character. (It is judicially decided that residence of one year in a particular State is not requisite.)

Minors.—Any alien under the age of 21 years who has resided in the United States three years next preceding his arriving at that age, and who has continued to reside therein to the time he may make application to be admitted a citizen thereof, may, after he arrives at the age of 21 years, and after he has resided five years within the United States, including the three years of his minority, be admitted a citizen; but he must make a declaration on oath and prove to the satisfaction of the court that for two years next preceding it has been his *bona fide* intention to become a citizen.

Children of Naturalized Citizens.—The children of persons who have been duly naturalized, being under the age of 21 years at the time of the naturalization of their parents, shall, if dwelling in the United States, be considered as citizens thereof.

Chinese.—The naturalization of Chinamen is expressly prohibited by the Laws of 1882.

Protection Abroad to Naturalized Citizens.—The Revised Statutes of the United States declare that "all naturalized citizens of the United States while in foreign countries are entitled to and shall receive from this Government the same protection of persons and property which is accorded to native-born citizens."

The Right of Suffrage.—The right to vote comes from the State, and is a State gift. Naturalization is a Federal right and is a gift of the Union, not of any one State. In nearly one half of the Union aliens (who have declared intentions) vote and have the right to vote equally with naturalized or native-born citizens. In the other half only actual citizens may vote. The Federal naturalization laws apply to the whole Union alike, and provide that no alien may be naturalized until after five years' residence. Even after five years' residence and due naturalization he is not entitled to vote unless the laws of the State confer the privilege upon him, and he may vote in several States six months after landing, if he has declared his intention, under United States law, to become a citizen.

In Other Countries.— In France a foreigner who has obtained permission to become domiciled in France is entitled to letters of declaration of naturalization after three years' residence. Also, by the French Naturalization Act, 1889, a foreigner who has resided in France for 10 years may at once be naturalized without preliminary ceremony. In Germany naturalization can be conferred only by the higher administrative authorities; the applicant must show that he is at liberty, under the laws of his native country, to change his nationality, or, if he is a minor, that his father or guardian has given him the requisite permission, that he is leading a respectable life, that he is domiciled in Germany, and that he has the means of livelihood. In all countries a married woman is held to be a citizen of the state of which her husband is for the time being a subject, and the naturalization of a father carries with it that of his children in minority. In countries where military service is compulsory naturalization in fraud of this either is prohibited or renders the offender liable to imprisonment, if he returns, and forfeiture of all property subsequently acquired in his native country. Certain privileges of British nationality may be acquired by the issue to an alien of letters of denization granted by the crown; and for this no previous residence is required.

Nature Printing, a modern process for obtaining impressions from leaves, fibres, lace, etc. In one method the object, such as a fern frond, is placed between a steel plate and one of heated lead and subjected to a strong pressure, forming an exact intaglio copy in the lead from which impressions are taken.

Nature-study, an educational means of putting the child into direct contact and sympathy with its own life. Education has been largely unrelated to the daily life. The child has lived in one world and has gone to school in another world, and to church in still another. The child lives in a certain environment. The phenomena and objects and portent of this environment should be elucidated to the child to the end that his life may be made meaningful and resourceful at the same time that the intellectual powers are developed and strengthened. In other words, any subject, however common, is capable of being put into pedagogic form and being made the means of training the mind. This is the natural development, as it is natural for the plant to draw its sustenance from the soil and air about it rather than from the soil and air of some other region. The best primary educational means are those that begin with the subjects with which the child lives day by day.

The subjects with which a child lives are «natural» subjects; hence the term «nature-study.» Nature-study has to do with the things and events of the child's customary environment. The term itself is not wholly a fortunate one, since it would seem, in the common use of the word to indicate a «study» or a piece of «work» or a subject for a school «period,» as if it were co-ordinate with geography and writing and English. Nature-study is not merely a subject to be taught: it stands for an attitude toward education and toward living. It stands for open-mindedness and sympathy toward common things and ordinary conditions rather than a mere acquirement of extraneous things. Nature-study teaches in terms of the pupil's life,— the weather, the plants, the animals, the fields, the streets, the affairs of the home and the school and the hamlet or the ward. «Using the common things and events as educational means» is a phrase that expresses the main idea that underlies the term nature-study.

Yet, there is another and vital conception in the nature-study idea: we are to teach by means of the common things for the purpose of putting the pupil into a sympathetic attitude toward his life and environment, not merely to impart knowledge of the things and phenomena themselves. Sympathy is the keynote of nature-study. In this it differs from the traditional teaching of science, and in this it is adapted to the young mind. The customary teaching of science may not open the mind to any sense of loving relationship to its own environment. It may be wholly extrinsic and exotic. Science-teaching has often become as dogmatic and as devoid of the breath of life as mere philosophy or history were in the years just passing. The pupil may not be so near to life and to his own problems when dissecting a necturus as when studying the history of Rome. Both are out of place and out of touch with mere children: they are subjects for later years. «Science,» as commonly taught, is a subject for maturing and mature minds, not for beginners. Nature-study accepts the child's outlook on the world and uses it as a means of developing the child. Gradually, nature-study leads to the science point of view, preparing for the instruction in the advanced grades.

It is not to be supposed, however, that nature-study is unscientific. On the contrary, it should follow the laws of the development of the child's mind, and therefore be eminently scientific. But it is scientific only in itself, and not in the sense that it teaches science, as the word «science» is commonly interpreted in the schools. Science-teaching has for its main purpose the discovery of truth. Its spirit is investigational. It would make investigators. Yet, as a matter of fact, it is as good science to put the child first of all into a correct attitude toward nature as later to develop his research instincts.

It is to be regretted that much of the teaching that passes as nature-study seems to have no permanent pedagogical value. This is almost necessarily the case, since the nature-study movement is new as a matter of practice, however old it may be as a matter of theory and principle. It is in large measure a revolt from the formal and «dry» science-teaching, and its method is therefore essentially personal and informal. We are now in the experimental era. Perhaps no one yet knows how nature-study may best be handled in the schools. It is certain, however, that it should deal with actual things and phenomena. Its underlying method is observation,— the child actually to see the thing for himself, to know it intimately from first-hand contact. As a pedagogical method, the teaching of nature-study does not deal with abstractions, nor mere sentimentalism, nor primarily with poetry or nature-study literature. It asks, What is the thing? What does it do, or how does it live, or why is it here? What relation does it bear to the conditions in which it is found?

The term nature-study is of common-school origin. It is very modern. It seems to have come into use in this country between 1884 and 1890. It grew out of "object teaching" and "elementary science" and "natural history." It is not equivalent to the teaching of zoology and botany, as classified sciences. It cares little for zoology and botany and geology, but everything for animals and plants and the out-of-doors. It is in large measure a return to the ideals of Rousseau, Froebel, Pestalozzi, and others, combined with a reaction from the unfree and over-nice laboratory methods into which we have fallen in the schools. Nature-study is an emancipation. Although nature-study is specially a common-school movement, its spirit is nevertheless of universal application, and, consciously or unconsciously, it is coming to dominate the point of view in all good nature-teaching anywhere,— in the actual study of the object in its natural setting.

The nature-study idea is one of the movements that are democratizing education. The Greek and mediæval ideals are adapted to the few and the special rather than to the many. We have believed that some few subjects alone are profitable as educational means; these subjects are the ones that are most capable of being put into books. But a subject that cannot be put in a book is nevertheless capable of being made the means of training a mind,— and among these subjects are those that make the most direct and personal appeal to children and youth. It is not to be supposed that the older subjects are to be banished from the schools, but only that new ones are to be added. We are just now perplexed as to how to handle the many subjects that are coming into the schools. The truth is, however, that all subjects with which men engage and in which they are interested are to be taught, both as a means of intensifying the hold on life and of enlarging the spiritual horizon. We have made the mistake of thinking that some subjects lead to "culture" and that others do not. All subjects should lead to that end. How to adapt and use all these many subjects in the schools is not the purpose of this article to inquire: this must be worked out with patience and forethought in the time that is just ahead of us.

We have reason to expect a gratifying secondary result of the nature-study idea in the movement that it must set up toward the country. There is still a strong tendency to remove to the city. The attraction to the city is both financial and social, chiefly financial. It is time that we set other ideals than money. The person that understands soils and plants and animals and fields should be able to develop the resources of the country and to make a comfortable living from the land; and the mind that is sympathetic with nature does not need to go to the city for entertainment. Our educational systems and points of view are chiefly such as help the city man rather than the country man.

While it is not the purpose to enter into a discussion of the methods of teaching nature-study, attention should be called to some of the most important dangers. (1) There is danger of giving relatively too much attention to mere subject-matter or fact. Nowhere should the acquiring of mere information be the end of an educational process, and least of all in nature-study, for the very essence of nature-study is spirit, sympathy, enthusiasm, attitude toward life. It is these results that the youth gets naturally when he associates in a perfectly free and natural way with objects in the wild. Science-teaching has often fallen short of its goal in the elementary schools — and even in the colleges and universities — by insisting so much on the subject-matter as to forget the pupil. In standing so rigidly for the letter, we have missed the spirit. (2) A second danger is making the instruction too long and too laborious. A child's mind cannot be held to a subject profitably for any great length of time. As soon as the child becomes weary of giving attention, the danger-point is reached; for thereafter there is loss in the spirit and enthusiasm, however much may be gained in dry subject-matter. Even in high schools and colleges we make mistakes in demanding too long-continued application to one subject. Short, sharp, enthusiastic exercises, with pith and point, of five to ten minutes' duration, are efficient and sufficient for most purposes, particularly with beginners. (3) A third danger is the practice of merely telling or explaining. Set the child to work, and let the work be within the child's own realm. Pollen, lichens, capsules, lymphatics, integuments — these are not within the child's range: they smack of the museum and the text-book. Yet it appears to be the commonest thing to put mere children at the subject of cross-fertilization: they should first be put, perhaps, at flowers and insects. In every schoolroom might be hung with profit the motto, "Teaching, not telling." (4) A fourth point is the danger of adhering too closely to the book habit We are gradually growing out of the book slavery even in arithmetic and grammar and history. This means a distinct rise in the abilities of the teacher. Of all subjects that should not be taught by the book, nature-study is chief. Its very essence is freedom from tradition and "method." Nature-study books are most useful as sources of fact and inspiration, but not as class texts. The good teacher of nature-study must greatly modify the old idea of "recitations." President Eliot writes: "Arithmetic is a very cheap subject to teach; so are spelling and the old-fashioned geography. As to teaching history in the old-fashioned way, anybody could do that who could hear a lesson recited. To teach nature-studies, geometry, literature, physiography, and the modern sort of history requires well-informed and skilful teachers, and these cost more than the lesson-hearers did." (5) Finally, we must come into contact with the actual things, not with museums and collections. Museums are little better than books unless they are made to be very secondary means. The museum has now become a laboratory. The living museum must come more and more into vogue — living birds, living plants, living insects. The ideal laboratory is the out-of-doors itself: but for practical school purposes this must be supplemented. The most workable living laboratory of any dimensions is the school-garden. The true school-garden is a laboratory plat; time is coming when such a laboratory will be as much a part of a good school equipment as blackboards and charts and books now are. It will be like an additional room to the school building. Aside from the real school-garden, every school premises should be embellished and improved as a matter of neighborhood and civic pride; for one cannot expect the child to rise above the conditions in which it is placed. All these dangers cannot be overcome by any «system» or «method»; they must be solved one by one, place by place, each teacher for himself. Whenever nature-study comes to be rigidly graded and dressed and ordered, the breath of life will be crushed from it. It is significant that everywhere mere «method» is giving way to individualism.

In time, the methods of teaching nature-study will crystallize and consolidate about a few central points. The movement itself is well under way. It will persist because it is vital and fundamental. It will add new value and significance to all the accustomed work of the schools; for it is not revolutionary, but evolutionary. It stands for naturalness, resourcefulness, and quickened interest in the common and essential things of life. It is strange that such a movement is necessary. It would seem to be the natural, and almost the inevitable, thing that the education of the child should be such as to place it in intimate relation with the objects and events with which it lives. It is a fact, however, that our teaching has been largely exotic to the child; that it has begun by taking the child away from its natural environment; that it has concerned itself with the subject-matter rather than with the child.

The literature of nature-study is of three groups: that dealing with the underlying pedagogical conceptions, a group that is yet small and undeveloped; that setting forth courses and methods, a group that comprises a large number of books and leaflets; that of the «nature writers,» appealing to the general public, and now very voluminous. Probably no recent development of literature is so marked as the writing about «nature»; and this tendency is a good criterion of the enlargement of our sympathies and of our growing interest in realities. All publishers of educational books issue nature-study guides and texts. and the number is rapidly increasing; it is therefore impossible to give a list here. Some of the American writers in the educational field, aside from specialists in the various departments, are W. S. Jackman, C. F. Hodge, Mrs. L. L. W. Wilson, F. O. Payne, O. P. Jenkins, V. L. Kellogg, D. Lange, C. B. Scott, C. A. McMurray, A. C. Boyden.

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Nature Worship, a religious belief in which the powers of nature are personified and worshipped. It found its highest and most beautiful expression in the mythology of ancient Greece. In the classification of religions with regard to the estimation in which the Deity is held, Lubbock makes nature worship the second stage, atheism (the absence of definite ideas on the subject) being the first. See Mythology.

Naucratis, nâ'kră-tĭs, Egypt, an ancient Greek colony, the remains of which are near Nebireh, 50 miles by rail southeast of Alexandria. It existed as early as the beginning of the 7th century B.C., and was approached by a navigable canal in the western part of the Delta, near the Canopic branch of the Nile. Its chief period of splendor was during the reign of Amasis II., 570–520 B.C., under whom it was recognized as the official capital of the Greeks in Egypt. Its site was rediscovered in 1884 by Professor Flinders Petrie. Subsequent excavations have uncovered the remains of buildings described by Herodotus, the Hellenium, temples to Apollo, Aphrodite, the Dioscuri, etc., and there have been valuable finds of early Greek pottery and other archæological treasures. Consult Petrie, ‘Naucratis’ (1886).

Naucydes, nâ-sĭ'dēz, Greek sculptor. He flourished in the first quarter of the 4th century B.C. His birthplace was Argos and he was the pupil of the Elder Polycletus of the Peloponnesian school of sculpture. He carved a chryselephantine statue of Hebe for the temple of Hecate at Argos; a bronze statue of Hecate; a Hermes; several statues of Victory; a portrait of the poetess Erinna; ‘Phryxus Sacrificing the Ram’ (for the acropolis at Athens); and a Discobolus. The younger Polycletus was his pupil.

Naugatuck, Conn., town and borough in New Haven County; on the Naugatuck River, and on a division of the New York, N. H. & H. railroad; about 28 miles south by west of Hartford and 15 miles northwest of New Haven. In 1844 it was incorporated as a town, and as a borough in 1893. The chief manufactures are rubber goods, paper boxes, knit goods, machine-shop products, and cigars. It has considerable trade in farm products, especially tobacco. It is well supplied with schools; it has besides the public and parish elementary schools, the Whittemore High School, the Salem School, Sacred Heart Academy (R. C.), and the Whittemore Memorial Library. The government is vested in a board of warden and burgesses, who hold office one year, and who appoint all the administrative officials except the board of education, the members of which are chosen by popular vote. Pop. (1910) 12,722.

Naugatuck, nâ'ga̤-tŭk, a river in Connecticut, has its rise in the northern part of Litchfield County, and flows south, about 60 miles, and enters Housatonic River at Derby. It flows through a mountainous part of the State, and supplies water power to many mills and factories. Waterbury (q.v.) is the chief city on its banks.

Naulette, nō-lĕt', a large cavern in Belgium, near Dinant. Here, in 1866, was found the lower jaw of a human, together with the bones of the elephant and rhinoceros. The human remains were assigned to the Monsterian epoch.

Nauma'chia, or **Naumachy** (from the Greek *naus*, a ship, and *machē*, a fight), among the Romans a public spectacle, representing a naval action. Cæsar was the first who exhibited a spectacle of this sort, which soon became the favorite amusement of the Roman people. Buildings were erected by the emperors, specially adapted for the purpose. They resembled the amphitheatres, and like them were at first built of wood. Domitian erected one of stone. A *naumachia*, built by Augustus, was 1,800 feet long and 200 wide, and was capable of containing 50 ships with three banks of oars, besides many small vessels. They were suddenly laid under water by means of subterranean canals, so that the ships were raised at once from the dry floor before the eyes of the spectators. These sea-fights were exhibited with the same splendor and reckless disregard of human life which characterized the gladiatorial combats. Titus exhibited a sea-fight in which 3,000 men were engaged, and ships almost equal in number to two real fleets were shown in combat by Domitian.

Naumann, Johann Friedrich, yō'hän frēd'-rĭн now'män, German ornithologist: b. Ziebigk, Germany, 14 Feb. 1780; d. there 15 Aug. 1857. He studied with his father, who was an ornithologist, and became professor and inspector at the ornithological museum of the Duke of Anhalt-Köthen. His most valuable contribution to the science of ornithology is the 'Naturgeschichte der Vögel Deutschlands' ('Natural History of the Birds of Germany'), published in 1822–4; he prepared the illustrations for this work, making the plates for more than 500 copper engravings. He also wrote 'Taxidermie' (1815); 'Ueber den Haushalt der nördlichen Seevögel Europas' (1824); and, with Buhle, 'Die Eier der Vögel Deutschlands und der benachbarten Länder' (1819–28). A statue of him was erected at Köthen in 1880, and the German Ornithological Society named its official organ in his honor 'Naumannia.'

Naumann, Johann Gottlieb, yō'hän gŏt'lēb, German composer: b. Blasewitz, near Dresden, 17 April 1741; d. Dresden 23 Oct. 1801. Thanks to the interest of a rich Swedish amateur, Weeström, he was taken to Italy when 16, and there studied under Tartini. He became court composer at Dresden in 1765, and kapellmeister in 1774, a post to which he returned in 1786, after six years in Stockholm. His music, including operas, oratorios, and symphonies, was essentially Italian in style and is no longer popular. Consult the biography by Nestler (1901).

Naumann, Karl Friedrich, son of J. G. Naumann (q.v.), German mineralogist: b. Dresden 30 May 1797; d. there 26 Nov. 1873. He was educated at Freiburg, Jena and Leipsic, and in 1821 made a scientific tour in Norway. He was an instructor in the University of Jena in 1823, and professor at Leipsic in 1826. From 1826 to 1842 he was professor of crystallography at Freiburg, and from 1842 till shortly before his death held a professorship at Leipsic. Among his works are: 'Anfangsgründe der Krystallographie' (2d. ed. 1854); 'Elemente der Mineralogie' (12th ed. 1885).

Nau'mannite, in mineralogy, is the name given to a native selenide of silver and lead found in the Harz Mountains and so called from K. F. Naumann (q.v.). This mineral contains about 26 per cent of selenium, 65 per cent of silver, and 6 per cent of lead; in some samples a great part of the silver is replaced by lead. Specific gravity about 8.0. Color and streak iron-black.

Naumburg, nowm'boorg, or **Naumburg-on-the-Saale,** zä'lĕ, Germany, a town of the Prussian province of Saxony, on the Saale, near the junction of the Unstrut, 28 miles southwest of Halle. Its chief edifice is the restored cathedral, which has four lofty towers, one the gift of William II., erected in 1894. The town has some manufactures and a considerable wine trade. Glass and porcelain painting is also an extensive industry. It became an episcopal see in 1029. In the 15th and 16th centuries, several treaties were concluded at Naumburg, and the town was of great strategical importance during the Thirty Years' war and the wars of 1806 and 1813.

Nauplia, nâ'plĭ-ạ, Greece, a fortified seaport town, capital of a nomarchy, at the north extremity of the Gulf of Argos, 25 miles by rail south of Corinth. It was occupied by the Venetians in the 13th century and was taken by the Turks in 1540. From 1824 to 1835 it was the capital of Greece, but declined in importance after the removal of the court to Athens. Pop. about 15,000.

Nauplius, nâ'plĭ-ŭs, in Greek mythology, the son of Neptune and father of Palamedes. He is said to have revenged the death of his son by deceiving the Greeks by false beacons, as they returned from Troy, and causing their vessels to be wrecked. See Mythology.

Nauplius. See Larva.

Nausea (Latin, from Greek *ναυσία*, seasickness), a sensation of sickness and distress, of which the leading characteristic is squeamishness of the stomach. The disturbance, however, extends to the entire system. In severe cases languor affects every part; the pulse is small; the skin moist and pale; the flow of saliva increases; and if vomiting does not immediately accompany the sensation, the apprehension of it is painfully present. The causes of nausea are many: blows upon sensitive parts, mental shocks, hysteria, pregnancy, irritation or tumors of the abdominal or the pelvic viscera may produce it, as may also the early stage of zymotic disease, or epilepsy, diseases of the brain, etc. See Vomiting.

Naushon, nâ-shŏn', the largest of the Elizabeth Islands (q.v.), off the southeast coast of Massachusetts.

Nautch, nâch, in India, a dance performed by the dancing girls attached to the temples, called Nautch girls or Nautchee, who are brought up and trained to all the arts and allurements of their profession. It is probably a survival of the ancient custom of sacred prostitution. They move with slow, undulatory movements of the body, while the feet are but little used.

Nautical Almanac. See Almanac; Navigation, the Science of Modern.

Nautical Schools. See Naval Schools; Naval Service.

Nautical Surveying. See Hydrography; Surveying.

Nau'tilus, a marine cuttlefish of the genus *Nautilus* and family *Nautilidæ*, a few living species of which are the only survivors of the order or superorder *Tetrabranchiata*, which including both the nautiloid forms and the ammonites (q.v.) is divided into no less than 22 extinct families, so abundant were they in past ages. The nautiloids began in the Cambrian, became greatly differentiated and abundant in the Silurian and Carboniferous, and by the close of the Palæozoic Age had become almost entirely extinct. The more complex ammonites, on the other hand, reached their full development only during the Mesozoic Age. The shell of the pearly or chambered nautilus, described below, is typical of the armature of the group. It is at first simple, but as the animal grows becomes coiled in a flat spiral and divided by internal transverse septa into a succession of chambers, the last one of which is occupied by the animal. This process is continued until about 36 chambers have been formed, all but the last filled with gas which gives a certain buoyancy, but does not enable the animal to come to the surface. Externally the shell is porcellaneous; internally is a layer of mother-of-pearl. The septa are perforated by an opening, through which a fleshy cord or siphuncle passes from the posterior end of the animal to the apical or first chamber of the spire. Among other anatomical peculiarities the animal has four gills and four kidneys, calcareous instead of horny beaks, a funnel composed of two lobes instead of one tube, small stalked eyes, and no ink bag. Quite unique are the tentacles, which number about 90. On each side of the head are a hood tentacle, two ocular tentacles, and 17 brachial tentacles, and around the mouth four groups of 12 or 13 labial tentacles.

The best-known species is *Nautilus pompilius* which, with two others, inhabits the Indian Ocean and tropical parts of the South Pacific. They live exclusively on or near the bottom in relatively deep waters, are gregarious, more or less migratory, and nocturnal. Although fond of any animal matter, they feed chiefly on prawns. In swimming they dart quickly backward for short distances, with the tentacles either radiating or held together and stiffly projecting from the mouth of the shell; but they are inactive and rest most of the time on the bottom. Little is known of their breeding, which is supposed to take place in deep holes. The eggs are very large; including the capsule they measure nearly 1½ by ¾ inches. They are attached singly by the base, and the capsule is irregularly folded and fenestrated longitudinally in a most peculiar manner. This species is very abundant in about 60 fathoms of water in the Philippines, and large numbers are captured by the fishermen in bamboo fish traps or baskets constructed on the principle of the lobster pots in use on the New England coast and baited with any kind of animal offal. The shells are somewhat used in the arts, but the flesh is little esteemed for food, as is that of the native species by the Fiji Islanders. Consult: Willey, 'Zoological Results,' Part VI. (Cambridge, 1902), and Lacaze-Duthier, 'Arch. Zoologie Experimentale' (1892).

The «paper nautilus» is a very different animal, for which see ARGONAUT.

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Nautilus, in hydraulic engineering, a diving-bell requiring no suspension. Water admitted through the cock into pipes flows into the exterior chambers, causing the apparatus to sink. The workmen enter through an aperture at the top, closed by an air-tight cover, and can in still water move the machine in any required direction by stepping on the ground and pushing. Air is condensed in a reservoir at the surface to a degree somewhat greater than the condensation due to the depth, and passes through a pipe into the chambers rendering the machine specifically lighter than water, and enabling it to lift stones or other objects below. A gauge indicates the amount of lifting power attained as the air is admitted.

Nautilus Propeller, in marine engineering, a water-jet propeller on the reaction principle. Water is forced by a turbine driven from the engine, through two nozzles, one on each side of the vessel, and directed fore or aft. See NAVAL ARCHITECTURE.

Nauvoo, nâ-voo', Ill., city in Hancock County; on the Mississippi River; about 30 miles below Burlington, Ia. It is situated in an agricultural and fruit growing region in which grapes and berries are the chief products. The principal industries are connected with the manufacturing of wine and the shipping of wine and fruits. It is the seat of Saint Mary's Academy (R. C.).

Nauvoo was founded by the Mormons (q.v.) in 1840, and in 1846 it had a population of 15,000. It had mills, factories, stores, schools, etc. Its most conspicuous building was a temple built of white limestone, 130 feet long and 90 feet wide. The temple was not completed when the Mormons were expelled in 1846; in 1848 it was partially destroyed by fire, and in 1850 it was further ruined by a tornado. A company of French Socialists, called Icarians, took possession of Nauvoo in 1850 and remained until 1857. The «Nauvoo Legion,» a Mormon military organization, which embraced all the boys and men between the ages of 16 and 50, was founded here in 1840, and in 1857 was reorganized in Utah. At the last muster, in 1870, it had a membership of 13,000. Pop. (1890) 1,208; (1900) 1,321; (1910) 1,020.

Nava, nä'vä, a seaport of Japan. See NAFA.

Navajo Indians. The meaning of the word Navajo is indefinite; said by Benavides (1630) to signify «great planted fields»; it is probably not from the Spanish *navája,* «knife,» as has been supposed. An important tribe of the Athapascan or Tinne stock of Indians, now on a reservation of about 9,442,240 acres in northeastern Arizona, northwestern New Mexico, and southeastern Utah. Population estimated at 16,000. There is no evidence that the Navajos were seen by the Spanish explorers of the Southwest in the 16th century, although the latter passed through their present territory in 1540, 1583, and 1598; it is therefore believed that at this early period they were an insignificant agricultural tribe, but gradually increased in population largely through the adoption of natives of both allied and other stocks during succeeding years. Their territory is entirely within the arid region and their lands are chiefly desert; but in the cañons and about the bases of the mesas that abound in their territory, horticulture is practised through deep planting in the sandy soil, while in the valley of the Rio San Juan, which is the largest stream in their country, farming is carried on to a greater extent. Agriculture, however, forms but a meager part of the Navajo's subsistence, his livelihood being gained principally from the flocks and herds, of which, in 1902, there were 380,000 sheep and 67,000 goats, the former of which, besides furnishing the chief food supply, netted $150,000 in wool and blankets. These blankets, which have become celebrated, are woven by the women on simple looms and in pleasing and sometimes intricate designs of various colors. Formerly native dyes of rare delicacy of tone were employed, but in recent years these have given way to glaring aniline colors, and the decorative patterns have also been largely modified to meet the demands of the white man, so that as specimens of aboriginal handiwork very few of the Navajo blankets now woven are comparable with those formerly made. The Navajos also weave belts, garters, and saddle-girths, and make a few excellent baskets, mostly for ceremonial use. Some of the men are expert silversmiths.

Although more closely related in language to the Apaches than to any other tribe, the Navajos are greatly mixed, embodying elements of Pueblo, Shoshonean, Yuman, and even of Spanish blood; hence there is perhaps a greater variety in their physical features than among most Indian tribes.

The typical Navajo dwelling is a conical framework of logs or sticks covered with brush, bark, or grass, and earth, with a smoke-hole at the apex and a doorway in one side. Rude shelters with open fronts are erected for use in summer. If a person dies in a house the latter is believed to become haunted and is henceforth tabooed.

Dr. Washington Matthews, U. S. A., who has studied the inner life of the tribe, discovered the existence of 51 clans, grouped into about a dozen phratries, which latter, however, are probably not homogeneous organizations as among some Indians. A Navajo belongs to the clan of his mother, and a man may not marry a woman belonging to his own clan; or, as a rule, one of his own phratry. Their religion is elaborate and complicated. They have a great many ceremonies, most of which are performed for healing the sick, but others are conducted to insure success in planting, harvesting, building, war, nubility, marriage, travel, etc., and for bringing rain. Sacrifice, elaborate dry paintings with sand and pigments, masquerade, dancing, prayer, and song are the elements of the ceremonies, the gods being personated by the masked performers. No supreme god is recognized; there was no great creator of the world, the latter have existed, in the Navajo belief, at the time of their origin as a people. There are many beneficent gods as well as malevolent gods or genii, and devils.

Almost from the beginning of the 17th century the Navajos were enemies of the sedentary tribes and of the Spanish colonists, and although they were never so predatory and warlike as their Apache cousins, the Spanish villages and Pueblo settlements suffered almost continuously from their raids up to the time of the conquest of New Mexico by American forces in 1846, followed by the establishment of military posts throughout the Southwest. Treaties were made with the tribe in 1846, 1848, and 1849, but they were of no avail in keeping in check their depredations, which continued at intervals until 1858, expeditions meanwhile being led against them. In the year last named the Navajos killed a negro servant at Fort Defiance, as a direct result of which it became necessary to wage warfare against the Indians from August until December, during which 50 Navajos were killed and a large number of sheep and other stock lost. Another treaty was signed, but during 1860 the depredations continued, and another expedition was led against them, but without success. In April the natives boldy attacked Fort Defiance, but were repulsed. In the winter of 1860–1 an active campaign was made against them, and although practically their only loss was in sheep, they were compelled to sue for peace in February 1861, when an armistice of a year was agreed to, during which the troops were withdrawn. In a dispute over a horserace at Fort Fauntleroy (near the present Fort Wingate), New Mexico, a dozen Navajos were brutally killed. Emboldened by the withdrawal of the troops on account of the Civil War, the Indians resumed their raids, which they continued almost uninterruptedly until 1863, when Col. Christopher («Kit») Carson began operations against them and a plan was formulated to transfer the Navajos from their old haunts to Fort Sumner, at the Bosque Redondo, on the Pecos River, in eastern New Mexico. It was determined that all who refused to go after 20 July would be regarded as hostile and be treated accordingly, yet by the close of the year only 200 prisoners were at Fort Sumner or on the way thither. Early in 1864 Carson made a campaign to the Cañon de Chelly, in the heart of the Navajo country in northeastern Arizona, where he killed 23 and captured over 200 of the Indians. This taught the latter a lesson, so that by the close of 1864 more than 7,000 of the tribe were held as prisoners at the Bosque Redondo; these were increased to 8,491 in 1865, but it was supposed that this number did not represent more than half of the tribe. The experiment, however, proved a failure, so that after the death of about a thousand of the Indians, the escape of others, and an expenditure of about a million dollars in their support in a region ill-adapted to their progress, the remainder, numbering 7,304, were removed to their old country in July 1868, an appropriation of $422,000 having been made in that year to give them a new start. Since that time the Navajos have been peaceable and industrious. They make good laborers and are slowly developing agricultural pursuits. In 1902 they had 8,000 acres under cultivation, which yielded 1,200 bushels of wheat, 700 bushels of oats, etc., and 3,000 bushels of corn. They earned in addition a quarter of a million dollars by the product of their labor, and besides the sheep and goats above mentioned owned 47,260 horses, mules, and burros, and 8,000 cattle. There are 189 Navajo children in two government reservation schools, the support of which cost about $28,000 in 1902. There are also 4 sectarian missions and 2 mission schools on or near the reservation. Consult: Matthews, 'Navajo Legends' (1897), and the bibliography therein; Matthews, 'The Night Chant, a Navajo Ceremony' (1902); Mindeleff, 'Navajo Houses' (17th Rep. Bur. Am. Ethnology, 1901); Matthews, 'A Two-faced Navajo Blanket' ('American Anthropologist,' Vol. II., pp. 638–42, 1900); Hrdlicka, 'Observations on the Navajo' ('American Anthropologist,' Vol. II., pp. 339–45, 1900); Hollister, 'The Navajo and his Blanket' (1903).

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Naval Academy, United States, the most important naval school in America, established at Annapolis, Md., in 1845, by a special act of the Congress. The origin of this technical educational institution was due primarily to the efforts of George Bancroft, secretary of the navy. The Academy was opened 10 Oct. 1845, with Commander Franklin Buchanan as superintendent. For a time during the Civil War the school was removed from Annapolis to Newport, R. I. The Bureau of Navigation of the Navy Department has direct supervision of the Academy.

Admission of Students.—There are received at the Academy, one naval cadet for each member or delegate of the United States House of Representatives, one for the District of Columbia, and 10 at large. The appointment of cadets at large and for the District of Columbia is made by the President. The Secretary of the Navy, as soon after 5 March in each year as possible, must notify in writing each member and delegate of the House of Representatives of any vacancy that may exist in his district. The nomination of a candidate to fill the vacancy is made, on the recommendation of the member or delegate, by the secretary. Candidates must be actual residents of the districts from which they are nominated. The course of naval cadets is six years, the last two of which are spent at sea. Candidates at the time of their examination for admission must be not under 15 nor over 20 years of age and physically sound, well formed, and of robust constitution. They enter the Academy immediately after passing the prescribed examinations, and are required to sign articles binding themselves to serve in the United States navy eight years (including the time of probation at the Naval Academy), unless sooner discharged. The pay of a naval cadet is $500 a year, beginning at the date of admission. At the end of the third year the new first class is separated into two divisions, namely, the Line Division and the Engineer Division, the numbers of these divisions being proportioned to the vacancies that have occurred in the several corps during the preceding year. At the end of the six years' course appointments to fill vacancies in the line and in the Marine Corps are made from the Line Division, and to fill vacancies in the Engineer Corps from the Engineer Division. If, after making assignments as above, there should still be vacancies in one branch and surplus graduates in the other, the vacancies in the former may be filled by assignment to it of surplus graduates from the latter. At least 15 appointments from such graduates are made each year. Surplus graduates who do not receive appointments are given a certificate of graduation, an honorable discharge, and one year's sea pay.

The Course of Study.—When a cadet graduates he must be a seaman, an engineer, a true marine engineer, well acquainted with steam, electricity and ordnance, and a navigator and surveyor, and he must have a fair knowledge of his own language with some acquaintance with French and Spanish. To achieve this in four years he must be well grounded in the rudiments; he must have good health, and he must work hard. The course must be progressive and the instructors competent and in sufficient numbers to be able to instruct — not merely to examine and hear lessons. Even then the work of studying would be too hard for the average youth were it not for the fact that much of the practical work is good out-of-door exercise and the hard brain work is well balanced with plenty of physical exercise and healthy amusement. The instruction for the fourth class, that is for the first year, completes the study of algebra and geometry and includes trigonometry and descriptive geometry. In English it includes rhetoric and something of the art of writing English and Andrews' 'Manual of the Constitution.' French and Spanish and mechanical drawing are begun. It is a necessity for a naval officer to be able to read a drawing and to make a good working sketch. The naval architect, the marine engineer, and the ordnance engineer has each his special methods in drawing, with which the cadet must become familiar. Accordingly he starts drawing with the beginning of his course. All his professional work during this year is practical and is given him during the drill period. The academic year opens on 1 October and closes about 1 June; then comes the practice cruise, which is devoted almost entirely to practice professional work with some little study of the theory of professional subjects. The cruise ends about 1 September when the cadets have a month's leave to visit their homes. Academic life begins again on 1 October. During the third-class year the cadets complete their studies in the mathematical department. They have trigonometry, descriptive geometry, conic sections, differential and integral calculus. In English they study naval history. They continue the study of French and Spanish, and mechanical drawing, and take up the study of elementary physics and chemistry. Their practical work is continued during the drill period and on the practice cruise at the end of the academic year.

Second Class Men.—After the month's leave they take up their life at the Academy as second-class men, and now begin to take up the study of professional subjects. In the department of mechanics they study integral calculus, mechanics and hydro-mechanics. They continue the study of physics and chemistry and begin the study of electricity and magnetism. They continue mechanical drawing and lay the foundation for engineering in studying the principles of mechanism and mechanical processes, with marine engines and boilers. They study theoretical seamanship and the drill regulations for infantry and artillery. The practical work continues during the drill period and has advanced progressively so that the cadets are well prepared for the professional subjects of this and the following year. This is their last practice cruise, and by far the most important one, as they are now carefully instructed in their duties as officers. They are required to perform the work of officers at sea in handling the ship and managing the motive power, both steam and sail. They must work hard at practical navigation with instruments and charts. They visit the great shipyards of the country, listen to lectures and take notes, with the ships and engines under construction as object lessons. In their last year as first-class men all their studies are professional. They have seamanship and naval tactics, ordnance and gunnery, navigation, compass deviations and surveying, boilers, engineering materials, designing and naval construction, and electrical engineering. The practical work goes hand in hand with the theoretical during the drill period. The first class are the officers of the cadet battalion and under supervision perform much of the work of officers.

Sea Service.—At the end of their first-class year the cadets are graduated and are ordered to sea. Here they nominally continue their course for two years, being examined at the completion of that time and commissioned as ensigns. Actually their work as officers begins after leaving the Academy, and under the present necessity for more officers they perform the duties of even higher grades than that of ensign. In fact they perform the duties of commissioned officers without the rank or pay or right to pension or retirement in case of injury or illness in line of duty.

Athletics.— To discuss the training of cadets at the Naval Academy without mentioning athletics would be to leave out a most important factor in their character training. Boating, football, baseball, fencing, track athletics, and gymnasium work are all encouraged. The various competitive games are a source of amusement to all and of healthy exercise to many. Courage and skill are gained and self-denial must be practised by those who train for the various sports, and athletics furnishes one of the most important aids in training a youth to become an officer.

Academy Buildings.— In 1895 was commenced a new and improved plan of construction and reorganization of the school buildings at Annapolis. The new buildings are largely due to the efforts of two men — the superintendent at that time, Capt. Philip H. Cooper, now rear-admiral, and Col. R. M. Thompson, who graduated in 1868 and was in 1895 a member of the Board of Visitors. The board recommended the rebuilding of the Naval Academy and the energy of these two men pressed the scheme upon the government. The department was induced to order a board to consider and recommend a comprehensive plan for all the necessary buildings, and Colonel Thompson persuaded the New York architect, Ernest Flagg, to consult with the board and with Captain Cooper. A beautiful set of plans resulted, recommended by the board and approved by the department. But the Spanish War interfered and it was not till 1898 that an appropriation became available and the cornerstone of the new armory was laid by Rear-Admiral F. V. McNair, who had succeeded Captain Cooper as superintendent. The plan as viewed from the sea front shows the cadet quarters extending 729 feet, flanked on one side by the armory and on the other by the boat house. These buildings are at right angles to the direction of the cadet quarters, are 428 feet long and similar in appearance. They are connected by colonnades with the quarters. This gives from the sea a harmonious group of buildings extending in a northeast and southwest direction for 1,278 feet with the high roof of the main building of the cadet quarters as a centre. Thirteen hundred feet in a northwest direction, with the main line of buildings parallel to and facing the first group is the academic building with the chemistry and marine engineering buildings on either flank and with the high roof of the academic building in the centre and balancing the group to the southeast. Between these two groups, facing the Severn River and forming the west side of the rectangle, is the auditorium and chapel, with the superintendent's house and the administration building on either side. The fourth side of the rectangle is formed by the basin. From the steps of this basin and facing the auditorium is the best view. On either hand is a handsome group of buildings with the dome of the auditorium as the centre. The new buildings involved an outlay of over $8,000,000.

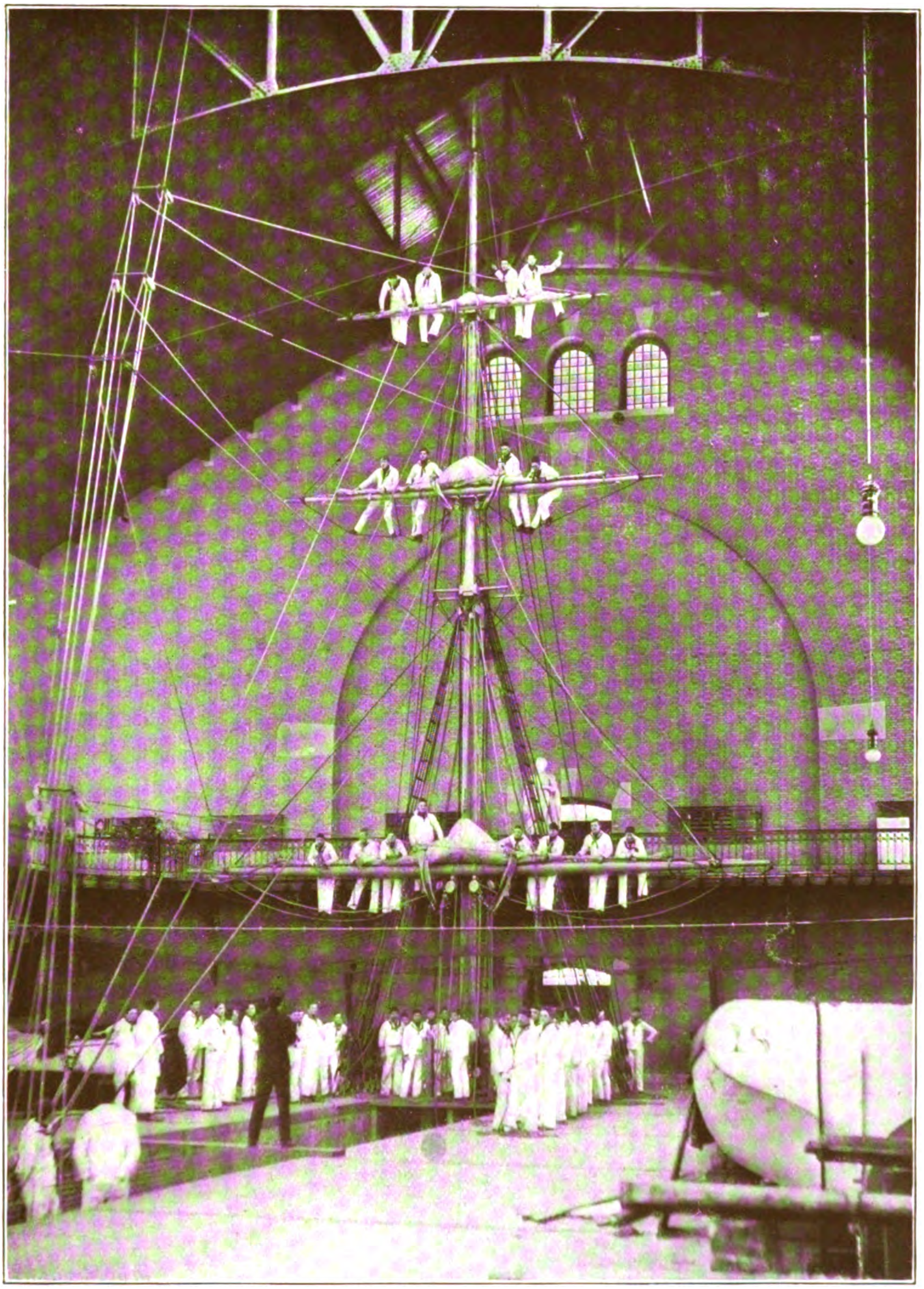
Naval Apprentice. See Naval Service.

Naval Architects and Marine Engineers, The Society of, an American society with over 500 members incorporated in New York State, and with headquarters in New York city. The society holds annual meetings and seeks to advance the art of shipbuilding.

Naval Architecture. The existence of naval architecture as an art is probably contemporaneous with the existence of man, but its development into a science is confined almost wholly to the 19th century and accompanied the advance in all mechanical sciences during that period. During the 18th century, and even earlier, some Continental mathematicians had devoted attention to the subject and developed various theorems concerning floating bodies which were likewise applicable to ships. Throughout this period the French were the acknowledged leaders in the development of knowledge relating to such matters. So much was this the case that it seems to have been not unusual for other countries to reproduce the models of French men-of-war, thereby admitting the excellence of the French type and paying deserved tribute to the labors of the naval architects of that country.

Perhaps the most notable attempt, however, to place naval architecture upon a logical and scientific basis, prior to 1800, was that of the famous Swedish naval architect, Chapman (1721–1808), who, during his long career, achieved special eminence in his profession and wrote a number of treatises relating to various features of naval architecture. One hundred years ago each nation, and, indeed, each master builder, carefully guarded as valuable secrets the methods and theories pertaining to the science of naval architecture, which had been deduced from experience or which had been handed down by those who had conducted previous investigations. This state of affairs, indeed, extended well into the 19th century, but with the rapid development of iron shipbuilding, which started about the middle of that century, came a rapid advance in naval architecture and dissemination of knowledge upon the subject, until, to-day, in the leading shipbuilding countries of the world will be found schools devoted to this subject; and the products of the naval architect's skill differ only in comparatively minor respects, whether turned out from British, European, American, or Japanese shipyards.

The primary object of the vast majority of all ships is to-day, as throughout the past, *transportation,* and the problem is only affected in its details in order to conform to the requirements of the articles carried, be they men, merchandise, or, in the case of men-of-war, armor, armament and other appliances for rendering



APPARATUS FOR INDOOR TRAINING IN HANDLING A FULL-RIGGED SHIP. I.

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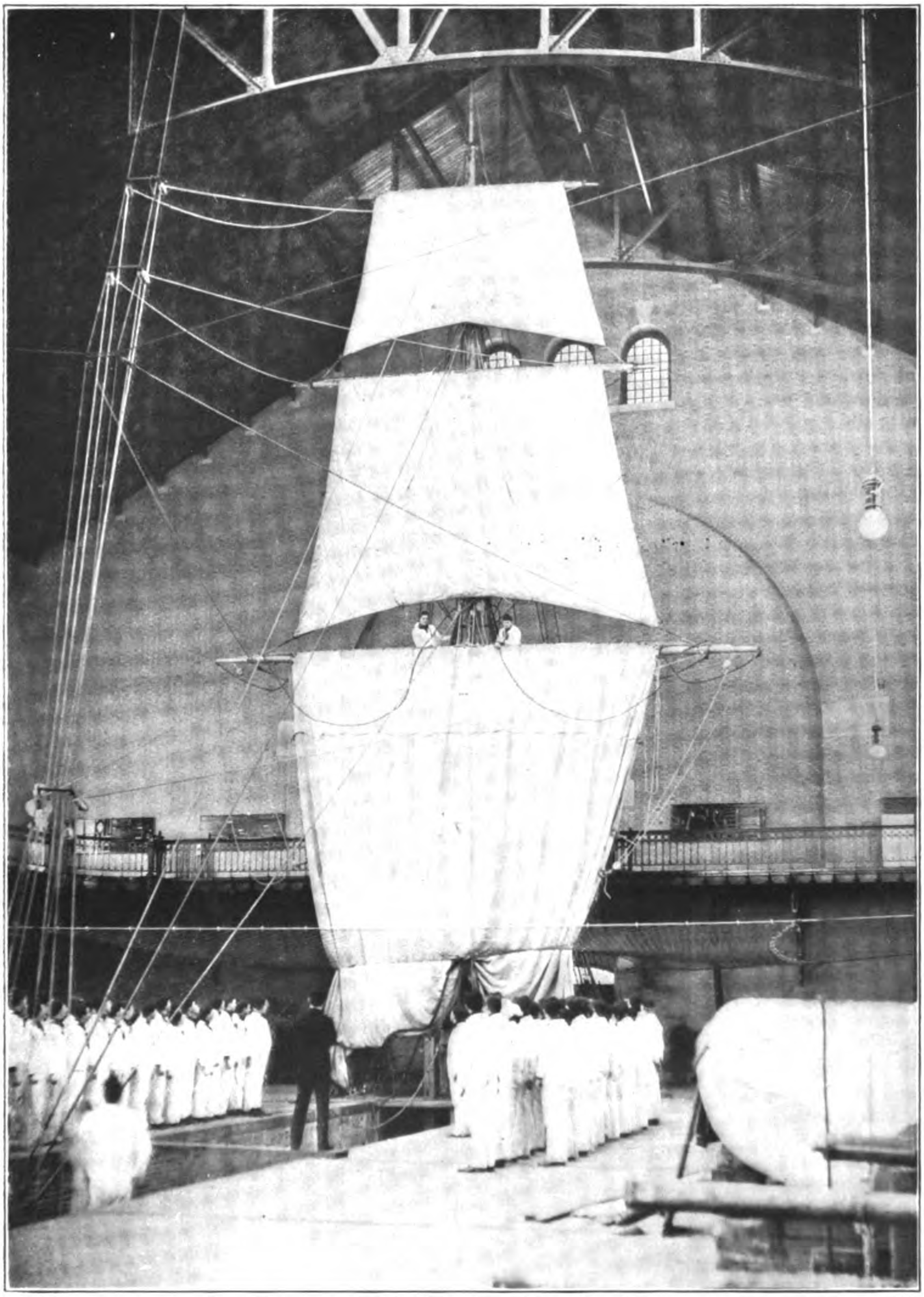

APPARATUS FOR INDOOR TRAINING IN HANDLING A FULL-RIGGED SHIP. II

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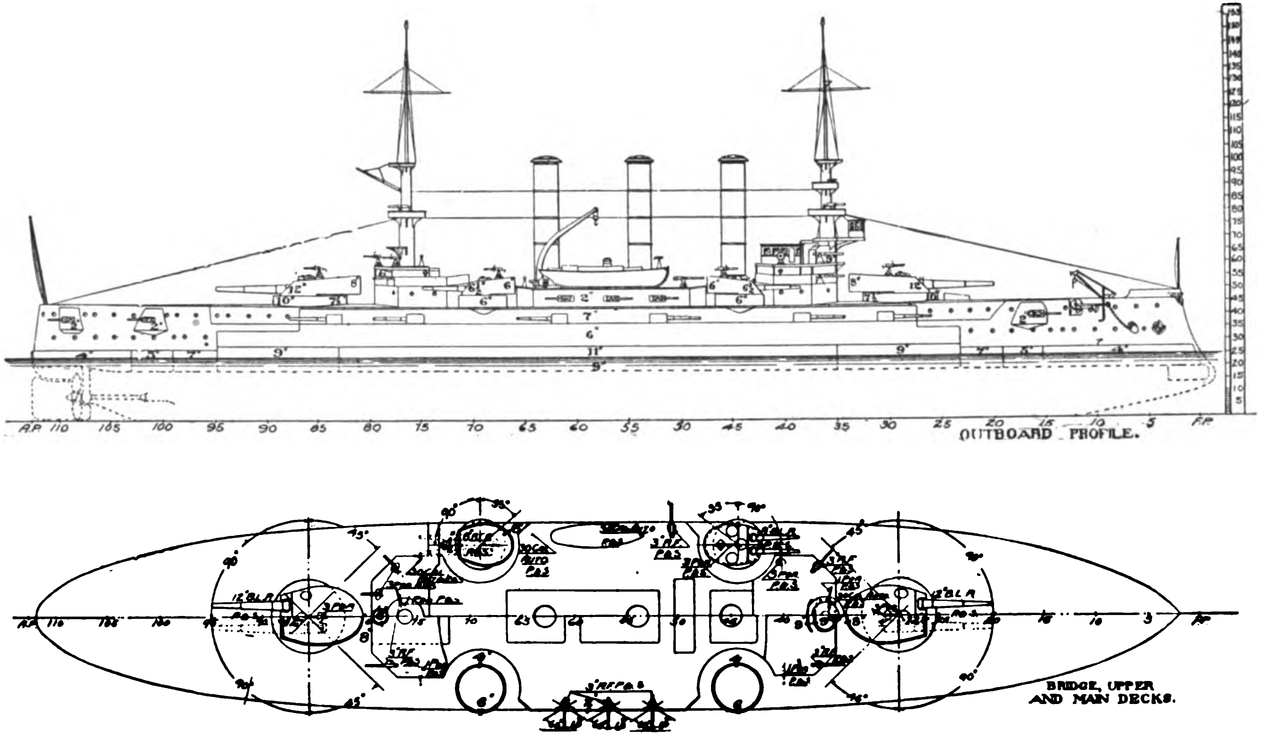
the vessel efficient as a fighting machine. The foregoing statement is quite as true of the humble 10-knot collier, which will carry in coal twice the weight of her hull, machinery, and outfit, as of the trans-oceanic passenger liner which carries a comparatively small amount of cargo but a large quantity of bunker coal to enable it to make a high speed, and provides luxurious accommodations for numerous passengers. It is true also of the man-of-war, which carries a proportionately large crew and a fair amount of cargo in the shape of consumable stores, coal and ammunition, besides a heavy weight of armor, armament and ammunition, and the necessary military adjuncts required by the special service upon which employed. Considering, then, all ships as bearers of burdens, there are two essential characteristics which they must show: They must be able to go from point to point at an appropriate speed and with all reasonable safety for ship, cargo and crew. Ability to keep the sea under all the usual conditions of its intended service is indispensable for every ship, and we will now consider briefly the detailed factors entering into the problem.

Buoyancy.—When a ship is entirely waterborne, the weight of water which it displaces is exactly equal to the weight of the ship itself and everything contained in it. To float at all, the volume of the enveloping surface of the ship must be greater than the volume of water which equals in weight the displacement of the ship. Clearly, for safety, there must be a margin, or reserve of buoyancy, in the ship over and above the buoyancy equal to its weight. The percentage of reserve buoyancy varies widely according to the type of vessel, passing from approximately zero in the case of diving, or submarine, boats (when in condition to dive), to as much as 100 per cent or more in the case of passenger vessels with large deck areas and high sides. In certain types of men-of-war, notably the large cruiser class, the percentage of reserve buoyancy is also very high. In the case of men-of-war, the reserve buoyancy is practically fixed by the design; but, in the case of merchant vessels, and particularly cargo carriers, which are subject to overloading, the reserve buoyancy is now practically determined by the marine insurance companies. The business of insuring ships and their cargoes is a large and important one, but is carried on by a comparatively small number of very powerful companies or associations, and these companies, for their own protection, have a well-equipped, scientific and technical staff and have prescribed conditions affecting the safety, or seaworthiness, of ships, which must be complied with in order to obtain insurance at a reasonable rate. In England, the Board of Trade, which is the department of the government charged with authority over matters relating to shipping, has acted in conjunction with the large insurance companies in laying down requirements for reserve buoyancy, these authorities being still further assisted by representatives of the national associations of naval architects. The actual amount of reserve buoyancy required varies somewhat with the size and type of vessel, and likewise with the character of the service, the maximum amount being required for vessels engaged in winter service in the North Atlantic Ocean. Speaking broadly, the objects aimed at in the load-line requirements are to obtain the greatest possible carrying capacity, compatible with safety of the vessel under all conditions of weather, after making provision for minor casualties which might still further reduce the reserve of buoyancy.

Structural Strength.—Buoyancy, however, is not the only requirement for seaworthiness of a ship. It is essential that the ship should be strong enough to withstand the stresses due to the action of the waves. In this direction, also, the insurance companies have taken a prominent position, and laid down minimum requirements acceptable for merchant vessels. Strength is obtained not only by the use of the best materials but by the disposition of the material used in such manner as to best accomplish the desired results. The methods used in determining the strength of ships are very similar to those used in determining the strength of other structures, such as bridges, but there is an essential difference due to the fact that it is practically impossible to determine the maximum load to which a ship may be subjected. It is comparatively easy to calculate the strength of the hull structure, knowing the disposition of the weights and buoyancy of the vessel. The stresses upon each part of the vessel's structure, when floating in still water, may be determined with accuracy; but the maximum stress will occur, not in still water, but among waves, and while we know that, whatever the motion of the sea, the buoyancy of the submerged portions of a ship must equal the total weight of the vessel and its contents (subject to minor corrections, due to the dynamic effect of the motions of the ship itself), it is obviously impossible to foresee the possible combinations and contours of waves to whose action the ship may be subjected and the consequent distribution of buoyant forces and structural stresses. Hence, the naval architect, in determining the structural requirements of a ship so far as they affect its strength, must be guided largely by experience. If he provides strength equal or superior to that of ships of the same type and not very dissimilar in size, which have shown no weakness in service, he has reasonable assurance that he is safe. But, when dealing with vessels of a novel type or size beyond precedent, the skill and judgment of the designer are taxed to the utmost to accurately estimate in advance and provide against the maximum stresses that may occur in service. In this respect, also, the accumulated experience of the marine insurance societies has been of great value in determining adequate strength associated with weight of structure which is not excessive, and which will permit a maximum development of carrying and other desirable qualities. The natural tendency of such societies, however, is to make sure of adequate strength, necessarily giving to weight and cost merely secondary consideration; so that whenever a novel type of ship is put forward, there is apt to be a period of discussion and unsettlement. The builders and owners naturally desire to provide only the minimum strength necessary, in their judgment, for complete seaworthiness, while, from the point of view of the insurer, if any error is made it should be positively on the side of excessive strength. As the results of experience accumulate, these questions adjust themselves, but with the rapid development in the size of ships, and the variations in types which have been witnessed during the last quarter of the 19th century, shipbuilders and the insurance societies have not been entirely in accord on such questions.

Stability.—In addition to the elements of adequate buoyancy and strength, there must be considered an equally important factor in the seaworthiness of the vessel,—namely, *stability*. This quality is all-important in rendering the vessel safe and enabling it to resist the capsizing effect of wind and waves. The stability problems which must be solved by the naval architect are practically peculiar to his profession. Sailing vessels, to avoid capsizing, must be handled with skill, and sail must be reduced in ample time to avoid the disastrous consequences of undue wind pressure. Steamers of the present day carry practically no sail, and are liable to be capsized by the sea only. But with them, too, there is room for skill in handling with reference to the direction of the waves, etc. It is the duty of the naval architect to provide a vessel, in either case, which, when handled with ordinary skill, will be stable under all probable conditions of wind and weather. The general features of the problem of stability are comparatively simple, and may be readily understood by considering a ship floating in still water. Under these conditions, the whole weight of the ship may be regarded as concentrated and acting downward through its centre of gravity. The upward forces of buoyancy may also be regarded as concentrated into a single upward pull through an imaginary point called the metacentre. With the ship at rest, the downward pull through the centre of gravity must be exactly equal to the upward pull through the metacentre. Evidently, if the metacentre is directly below the centre of gravity, there will be unstable equilibrium, since any slight accidental deflection of the centre of gravity would result in further deflection, the forces of buoyancy and gravity acting as an upsetting couple; if, however, the centre of gravity is below the metacentre, the resultant of the downward pull through the centre of gravity and the upward pull through the metacentre produces a righting moment tending to return the ship to the upright position. The name "metacentre" is supposed to have originated from the Greek word "meta," meaning "limit" or "goal" beyond which the centre of gravity cannot pass. Possibly it would have been more logical if the metacentre had been called the centre of buoyancy, thereby causing the nomenclature of the centre of buoyant forces to correspond more exactly to that of the centre of gravity. But in naval architecture, the centre of buoyancy is the name given to the centre of gravity of the volume of water displaced by the immersed portion of the ship. The line of action of the resultant upward forces of buoyancy must obviously pass through the centre of buoyancy, and it therefore follows that the centre of buoyancy and the metacentre are always found in one vertical line. The metacentre is not a fixed point but rises and falls as the ship inclines, owing to the varying shape and proportions of the immersed portion of the hull, and in every ship there is finally found an angle of inclination at which the metacentre is found directly below the centre of gravity. For inclinations greater than this, there is a tendency for the ship to capsize instead of right itself. The inclination at which this occurs is called the capsizing angle, and the angular range through which the vessel can be inclined without capsizing is called the "range of stability." Generally speaking, the less the freeboard (or height of side above water), the smaller the range of stability. In practice, the range of stability necessary for safety is affected somewhat by the initial metacentric height, or the distance between the centre of gravity and the metacentre when the ship is upright. The greater this distance, the greater the effort required to heel the ship, and hence the range of stability may be made less with safety. In practice, with any type of ship the range of stability can seldom be safely made less than 50°, and, in the majority of cases, should be much more. It is frequently over 100° for vessels of high freeboard. For safety alone, it is not always necessary that, initially, when in the upright position, the metacentre should be above the centre of gravity. If the metacentre is slightly below the centre of gravity, the vessel will heel over a few degrees to one side or the other until it reaches an inclination at which the metacentre rises above the centre of gravity and the vessel becomes stable again; if the freeboard of the vessel is high and the range of stability is great, such a vessel may be perfectly safe. Several of the large trans-Atlantic liners are purposely designed with comparatively small initial metacentric height, as such a condition permits the vessel to respond less quickly to wave action, and causes easy and slow rolling.

Rolling.—Closely associated with the question of stability is the question of rolling in a seaway. When a vessel is floating in disturbed water the effect is to change the relative location of the centre of buoyancy so that the metacentre shifts to one side or the other of a vertical line through the centre of gravity, causing a tendency to heel or roll the vessel until the metacentre again becomes immediately above the centre of gravity. Moreover, by this time the vessel has acquired certain angular velocity so that it swings beyond the position of equilibrium. An analysis of the theory of the rolling of ships at sea would be too complicated to be instructive in an article of this character, but, as in the case of stability, there are certain broad, underlying principles. These would be comparatively simple if in a floating body of ship-shape form the metacentre were fixed. In the case of a floating circular cylinder, such a condition does exist, the metacentre being fixed and remaining always at the centre of the cylinder. In such a case, the motion of a ship rolling is very closely analogous to what it would be if the vessel were suspended on pivots at the height of the metacentre. In such an imaginary case, in conformity with the well-known principles covering the motion of compound pendulums, the closer the metacentre is to the centre of gravity, the longer the period of oscillation, and the further the metacentre from the centre of gravity, the shorter the period of oscillation. In actual ships floating in water, however, the question is complicated by the varying position of the metacentre and the resistance of the water, which, in the absence of new disturbing causes, rapidly brings rolling ships to


OUTBOARD PROFILE.
A.P. 110 105 100 95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 F.P.
BRIDGE, UPPER AND MAIN DECKS.
12" B.L.R.
45°
90°

UNITED STATES BATTLESHIP CONNECTICUT.

Length over all, 456 ft. 4 in. Length on load water line, 450 ft. Breadth, extreme, 76 ft. 10 in. Mean draft to load water line, 24 ft. 6 in. Maximum draft at full load, 26 ft. 9 in. Displacement to load water line, 16,000 tons; full load, 17,770 tons. Freeboard, minimum at full load forward, 18 ft. 3 in.; aft, 17 ft. 9 in. Bunker capacity, 2,200 tons. Tons per inch at load water line, 63 16 tons. Number of engines, 2; type, vertical triple expansion. Diameter cylinders: H. P., 32½ in.; I. P., 53 in.; L. P., two of 61 in. Stroke, 48 in. Number of screws, 2. Number of boilers, 12; type, Babcock & Wilcox. Grate surface, total, 1,077 sq. ft.; heating, 52,752 sq. ft. Steam pressure, designed, 250 lbs. at engines, 265 lbs. at boilers. Designed speed, 18 knots, at a trial displacement of 16,000 tons. Indicated horse power, 16,500. Complement, 42 officers, 761 men.

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rest. But the fact remains that vessels of large metacentric height are inclined to roll very quickly, while those of small metacentric height are sluggish in their rolling motion. When floating among waves which are large as compared with the vessel, the vessel of great metacentric height tends to float like a board, keeping its deck fairly parallel to the surface of the water; while the vessel of small metacentric height will at times be found rolling toward the wave crest instead of away from it,— a very undesirable condition with low free-board vessels. In practice, vessels vary widely in their periods of oscillation. For a large vessel, perhaps the shortest period met with in practice would be that of a low-freeboard monitor, which, on account of its large metacentric height, may make a single roll from extreme inclination in one direction to the extreme in the other in from 2½ to 3 seconds, while a large vessel of small metacentric height may take as much as 20 seconds to the single roll. While rolling through small angles, say under 10°, the motion of a vessel is practically isochronous, that is to say, the period or time of completing a roll varies but little with the angle. This ceases to be true when vessels reach large angles of roll, say 30° or more. If there did not exist a retardation of roll in heavy rolling there would be grave danger of vessels, otherwise perfectly safe and seaworthy, being capsized by an accumulation of roll, every passing wave adding a little to the amplitude of roll,— well illustrated by the fact that with properly-timed impulses comparatively small forces will give large oscillations to a swinging weight. In actual practice, the skilled seaman can do much to limit excessive rolling by shaping the course of the vessel so as to produce complete lack of synchronism between the period of the ship and that of the waves. The naval architect, however, in the original design of the vessel utilizes the resistance of the water and provides "bilge" or "rolling keels," which aid materially in preventing heavy rolling. Bilge keels are projections at the bilge of the ship, approximately from one foot to three feet in depth, and extending usually for about half the length of the vessel and so situated when practicable as to offer maximum resistance to rolling. When properly fitted, bilge keels will often reduce the maximum angle of rolling, under adverse conditions, to less than half what it would be without them.

Speed and Resistance of Ships.—It has already been pointed out that an essential characteristic of all ships is mobility. The speed of a ship is a simple, concrete fact, readily appreciated by anyone and comparable with the speed of other ships; therefore, in many cases, it is considered the most conspicuous and important quality of a ship, whether man-of-war or passenger steamer. The keen interest taken by the general public in the speed records of passenger steamers engaged in trans-oceanic service fully illustrates this fact. The present accepted methods of determining the power necessary to drive a given ship at a given speed, and, conversely, the form of ship best adapted to be driven by a given power, are of comparatively recent development and largely due to the late William Froude, who, through an elaborate series of experiments, established the truth of the fundamental laws upon which are based the present theories of the resistance of ships. The resistance of a given ship, moving at a given speed, is made up of three main factors: first, the skin friction of the water on the surface of the ship. This is dependent only upon the surface exposed and the speed of the ship. It varies slightly with variation of form, due to this variation affecting the velocity of the water over the hull, but this variation is too slight to be taken account of in practice. The second element of resistance is what is called "wave-making resistance," due to the fact that a ship in moving through water produces waves and the force required to produce these waves proportionately reduces the power available for propulsion and thus, in effect, increases the resistance to the motion of the ship. The third element is what is called "eddy making," due to eddies of the water behind square corners of the hull and attachments, such as stern-post, propeller strut, etc. The eddy-making resistance is, however, comparatively small. The skin frictional resistance of a ship can be readily calculated with sufficient accuracy from the results of experiments upon the friction of plane surfaces drawn through water at known speeds. Mr. Froude demonstrated that the remaining resistances (wave and eddy making) of a full-sized ship could be estimated with great accuracy from a careful determination of similar resistances experienced by a small model of a ship when towed at a speed corresponding to the desired speed of the ship, the corresponding speeds of model and ship being in the ratio of the square roots of their linear dimensions. For a ship 500 feet in length, and a small model 20 feet long, the ratio of linear dimensions is 25; so that the actual speed of the model corresponding to 20 knots for the ship, would be $20 \div \sqrt{25}$, or 4 knots. By model experiments, also, it is comparatively easy to investigate the general effect of changes in shape and dimensions of vessels without having recourse to experiments with full-sized ships. The principles applied in passing from models to full-sized ships were also applied by Mr. Froude in passing from one full-sized ship to another,— being quite applicable if the two ships are similar, and applicable with fair approximation if the two ships are reasonably similar in proportions and shape.

Model Basins.—Experimental model basins are now found in nearly all shipbuilding countries. That of the United States is located at Washington. It is about 500 feet long, and, at its maximum section, the water is about 42 feet wide and 14 feet deep. Wooden models 20 feet long, made by special machinery, are used in this experimental work, the model being towed back and forth through the water by an electrically-actuated carriage which spans the basin. When erected in 1899, this was the largest experimental basin in the world. Later experimental basins built in Germany, however, are somewhat longer but not so deep or wide. From data obtained with models towed in the experimental basin, the effective horse-power, as it is called, necessary to tow the full-sized ship without engines, is determined with great accuracy. It is therefore necessary to establish, from actual trials, the relationship between this effective horse-power and the indicated horse-power which the ship's engines must exert.

This ratio depends upon the friction of machinery, efficiency of propellers, and to some extent upon the shape of the stern of the ship, and other minor factors; it is found, in practice, that it ranges from .50 to .60, although there is seldom reason why it should not be made as great as .55, a lower value being usually due to mistakes in design of hull, unsuitable propellers, or some such cause. The tabulated data obtained from experiments with models in the experimental basin, supplemented by progressive trial data taken under actual seagoing conditions, from the full-sized ships, have in recent years greatly aided the naval architect and the engineer in their design work, and the profession at large is under many obligations to the late William Froude and to his eminent successors in this work, among the most conspicuous of whom are R. E. Froude, in charge of the British Admiralty Experimental Tank at Haslar, and Naval Constructor Taylor, U. S. N., in charge of the U. S. Naval Experimental Tank at Washington, D. C., the writings of both of whom are generally recognized as valuable contributions to the literature of naval architecture.

Materials Used in Shipbuilding.—As the development of naval architecture has been largely influenced by the materials used in ship construction, brief allusion to these materials seems appropriate. The material used in the construction of ships underwent, broadly speaking, two changes during the 19th century: a change from wood to iron, which dates approximately from about the middle of the century, and a change from iron to mild steel, which dates from about 1880. Wood is still used as material for shipbuilding, many coasting vessels, for instance, in the United States and elsewhere being still built of wood; but the number and importance of wooden ships, as compared with those of iron and steel is diminishing yearly, and, at the present date, it may be said that the only structural material of importance for the construction of ocean-going ships is steel. Open-hearth steel, suitable for shipbuilding purposes, with an ultimate tensile strength of about 60,000 pounds to the square inch and an elongation in an 8-inch specimen of from 20 to 25 per cent before rupture, was introduced between 1870 and 1880. It was practically unknown in the United States in 1880. The contractor for the first steel vessels of the new Navy, which were contracted for in 1883, had to make special arrangements for the domestic manufacture of the steel needed in his work, and had to pay for it at that time about 7½ cents per pound. The growth of the manufacture of this material in the United States since that date, however, has been astonishing, mild steel of nearly the same characteristics as that used for ships being used in large quantities for bridges, houses, and other structures, so that, about 1900, its price had fallen as low as 1½ cents per pound, as compared with 7½ cents per pound some 15 years earlier. The qualities of the steel used in shipbuilding vary little in the different shipbuilding countries, being prescribed, as a rule, for merchant ships, by the marine insurance societies. For men-of-war, a somewhat higher grade of material is prescribed, and the inspection is rather more rigid. Coincident with the development of iron and steel as materials for shipbuilding, there began to develop an increase in the size of ships, due to the greater strength of the material of construction, and probably also to the fact that the use of steam instead of sails for propulsion, made it possible to increase the propulsive steam power of the large ships when it would not have been possible to add correspondingly to their sail area. The tendency towards an increase in size has been very marked since 1885, until now ships have reached sizes and dimensions limited only by the draft of water and the docking and wharf facilities available in the ports to which they trade.

The present state of development of naval architecture is probably best illustrated by examining the characteristics of some of the most recent products of shipbuilding skill in this country as exemplified in the principal characteristics of the United States battleship Connecticut and the trans-Pacific liner Minnesota, which are representative of our latest American designs of men-of-war and merchantmen. Commercially, it is found that the large steamer will carry freight or passengers cheaper at the same speed, or faster for the same cost, than the small steamer. The large man-of-war, on the other hand, is able to carry a much greater weight of armor and armament and can maintain a higher sustained sea speed than is practicable in a vessel of small displacement. See WARSHIPS.

W. L. CAPPS,
Chief Constructor, U. S. Navy.
D. W. TAYLOR, U. S. N.,
U. S. Naval Constructor, Washington, D. C.

Naval Cadet. See NAVAL ACADEMY, UNITED STATES; NAVAL SERVICE.

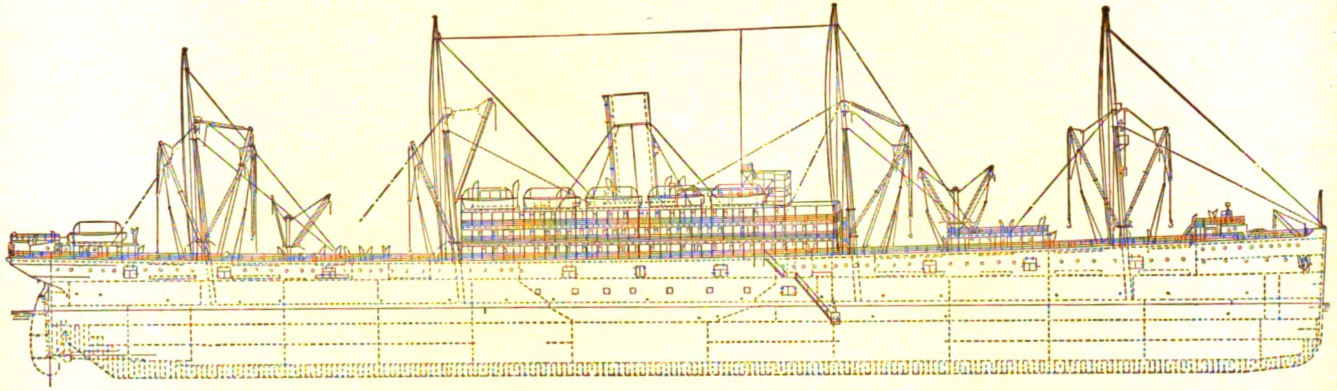
Naval Construction. See NAVAL ARCHITECTURE.

Naval Constructors are officers of the United States Navy, detailed to look after the designing, building, and repairing of warships. At every navy yard there is generally a naval constructor on duty. These officers are chosen from Naval Academy graduates and are prepared for their work by special education at technical schools. In 1902 there were 21 constructors and 20 assistants.

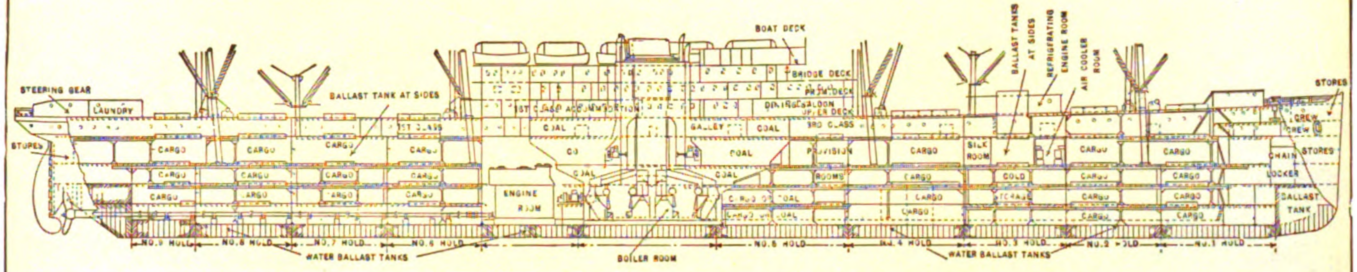
Naval Fleet. In times of war almost every known type of vessel is brought into action and comprises a part of the naval fleet. A squadron is usually a group of vessels of the same general build and character, as for instance a battleship with a force of cruisers, under the general command of an admiral. A fleet may include several commanders and all classes of vessels. These may be battleships, cruisers, monitors, torpedo-boats, destroyers, gunboats, submarines, tugs, colliers, transports, hospital ships, repair ships, distilling vessels, and refrigerating ships. Some of the last named craft are almost indispensable to a well equipped war fleet. A repair ship is an important adjunct and is fitted up like a machine shop, carrying spare plates, tools, and extra portions of machinery. She has forges, punching machines, etc., for repairing damages, and carries a crew composed to a large extent of machinists and iron shipwrights. The hospital ship is fitted with wards, operating rooms, modern appliances

NAVAL ARCHITECTURE.

OUTBOARD PROFILE
STEAMSHIPS MINNESOTA AND DAKOTA



INBOARD PROFILE
STEAMSHIPS MINNESOTA AND DAKOTA



Length over all, about 630 ft. Beam, extreme, 73 ft 6 in. Depth, bottom of keel to upper deck at center, 56 ft. 1 in. Upper deck to promenade deck, 8 ft. 6 in. Promenade deck to bridge deck, 8 ft. Bridge deck to boat deck, 8 ft. Boat deck to captain's bridge, 7 ft. 8 in. Bottom of keel to upper navigating bridge, 88 ft. 3¾ in. Total water ballast, 5,072 tons.

Total coal capacity with reserve bunker, 6,195 tons. Total cargo capacity, excluding reserve bunker, about 30,000 tons. Total stores, 250 tons. First-class passengers, 253. Intermediate class passengers, 68. Steerage passengers, 1,300 to 2,400. Crew, 250.

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for surgical operations, and for caring for the sick and carrying a large corps of trained nurses. In the United States navy this ship is painted white and flies the Red Cross flag, so that the foe may know her mission is sacred. She is absolutely unarmed. Most important, however, of these auxiliaries is the collier. A collier carries nothing but coal, everything being sacrificed to make room for bunkers and the machinery to take in and eject coal most expeditiously. The refrigerating ship carries an ice manufactory on board and immense cold-storage rooms for carrying fresh food. See NAVY OF THE UNITED STATES, THE.

Naval Guns. Gunpowder cannon for naval purposes appear to have been first used in the Orient. Old Japanese paintings of the 13th century depict naval combats between Chinese and Japanese fleets, the vessels being enveloped in the smoke from cannon. Among the Europeans, cannon began to be used at sea in the latter part of the 14th century. At first, galleys carried one gun, mounted in the bow and called a «corsiere»; later, sailing vessels carried small bombards mounted on the upper decks, which fired stone shot over the rails. Early in the 15th century, gun-ports were invented by the French, resulting in an increase of the number of guns carried, and before the end of the century, ships carrying as many as 60 guns each had been built by both the English and the French. From specimens still extant, it appears that these cannon were either constructed of wrought-iron or made of cast-brass; that they were sometimes of considerable length, and that some of them were breech-loaders. The guns of the Mary Rose, sunk in action with the French off Spithead, in 1545, were recovered in 1836. Some of them are of cast-brass, while the others are wrought-iron breech-loaders from 8 feet 6 inches to 11 feet in length, and from 5 to 8 inches in calibre. In loading these guns, the breech-piece was removed and the powder-charge placed in its forward end; the shot was inserted in the gun, and the breech-piece was replaced and held in position by a wedge from the rear. The difficulty of effectually closing the breech, however, appears to have caused a general abandonment of breech-loaders about the earlier part of the 17th century, and a reversion to muzzle-loaders made of cast iron and brass; inducing simple, rapid, and cheap methods of construction, which were steadily adhered to, during the following three hundred years. In the matter of projectiles, stone shot were gradually superseded by those of cast iron, while even rifling appears to have been attempted to obtain power and accuracy of aim. A rifle gun bearing the date of 1547 is one of the curiosities in the Woolwich arsenal, England. It is rifled with six grooves of a uniform twist of one turn in 26 inches. The extent of the use of guns at sea about the close of the 16th century is shown by the record of the armament of the «Invincible Armada.» It was composed of about 140 ships, carrying a total of about 3,000 guns, most of which were small — 4, 6, and 10-pounders. A few of the larger vessels, however, were better armed. The largest ship, the San Lorenzo, carried a total of 50 guns, varying in size from 4 to 60-pounders; while the Triumph, the largest vessel of the opposing English fleet, carried a total of 68 guns of about the same size. During the 17th century, the size and gun-power of individual ships was greatly increased. In 1737, the first English three-decker, the Royal Sovereign, carrying 150 guns, was built. Up to the beginning of the 18th century, the tendency in gun construction was to produce long guns of small calibre, under the impression that the range increased with the length of the gun. The advantages of the larger calibre in close engagements, however, were gradually recognized, and resulted in the production of the «carronades,» which were the most effective naval guns of that period. (See ORDNANCE.) The entire battery of the Victory, Nelson's famous flag-ship at the battle of Trafalgar, amounting to a total of 102 guns, was composed of carronades varying in size from 32 to 68-pounders. They were mounted on wooden truck carriages, and were given elevation by handspikes applied under the breech, a quoin or a wedge-shaped piece of wood being pushed in to hold the breech up in position. They were trained by handspikes with the aid of side-tackles, and their recoil was limited by a stout rope called the breeching, the ends of which were secured to the sides of the ship. At this time the slow match was commonly used for firing, and sighting was effected by looking along the exterior, or «line of metal» of the gun. Flint-locks were first applied to naval guns about 1780. The advantage of their use was appreciated in the sea-fight off Dominica, 12 April 1782, when the English fleet under Rodney defeated the French fleet under Comte de Grasse. In this action, Rodney's flag-ship, the Duke, carried guns fitted with flint-locks, and rendered such efficient service that they were applied to all guns and continued in general use up to about 1840, when they were superseded by percussion locks. Percussion locks were first introduced about 1828, when they were fitted to the guns of the United States frigate Vandalia, but their general use in the United States navy commenced about 1842, about 10 years later than their adoption by the French; while the English adhered to the flint-locks up to 1845. Improvements in sighting appear to have been first made by the English about the beginning of the 19th century. Fixed-sights were adopted by them in 1802, but they were superseded by the movable rear-sight invented by the French, some time later. About this time the Bomford «columbiads» were introduced and were found to be very effective as naval guns, and were followed in 1822 by the «Paixhans guns» which were quickly introduced in all navies. They were of considerable length, had long and narrow powder chambers, and fired solid shot and explosive shell at high velocities. Their introduction practically compelled the adoption of armor for ships. (See ORDNANCE.)

The creation of armored ships initiated the struggle for supremacy between guns and armor, which has continued up to the present time with unabated vigor, and caused the development of the high power rifled guns. The first of these were cast-iron muzzle-loading rifles and were used by the French and the English in the Crimean war. They showed such marked superiority over the smoothbores, that rifled guns were generally adopted by the various European countries, and persistent efforts were made, especially by Krupp in Germany, to perfect a breech-loading type. (See ORDNANCE.) In the United States, greater attention was paid to the production of a better class of high power smoothbores. The «Dahlgren» guns were brought out in 1856, and were unquestionably the best naval guns at that time, comparing favorably with the rifles of contemporary European make. They were followed by the «Rodman» guns, also smoothbores, which were superseded by the built-up wrought-iron and steel rifles, only when the demand for stronger material to resist the greater pressures developed, forced the rejection of cast-iron for that purpose. (See ORDNANCE.) The introduction of rifled guns was slow, and was attended by pecuniary and other difficulties. The «Parrott» rifles, built to meet the exigencies of the Civil War, were not capable of further development, and although used to some extent on ships, were not considered satisfactory for naval purposes. The lack of funds for the construction of modern guns on the lines developed by foreign private concerns, together with the desires of all countries to utilize in some way the large number of smoothbores in their possession at that time, compelled the adoption of makeshift methods to convert smoothbores into rifles, and postponed the development of truly modern gun construction until 1885. (See ORDNANCE.)

The greatest progress, however, has been made since 1898. This is best illustrated by the accompanying drawings showing the development of the 6-inch gun, from 1883 to 1901. The old gun 30 calibres in length, delivered its 100 pound projectile, with a muzzle velocity of 2,000 feet per second, while the velocity given by the latest type is 2,900 feet per second. This increase is due to its larger powder chamber, bigger charge, and the slow combustion of the powder and sustained acceleration of the projectile in its longer bore of 50 calibres. It will also be noted, that in spite of the great increase in length and weight, the new gun is of simpler construction, consisting of only six separate pieces, as against twelve pieces in the older form; while greater transverse strength is obtained by the substitution of a long jacket and a few long hoops for the large number of short hoops formerly employed. Modern naval guns are «built-up» steel rifles, capable of firing solid shot, or explosive armor-piercing shells, at high velocities and with great powers of penetration. (See ORDNANCE.)

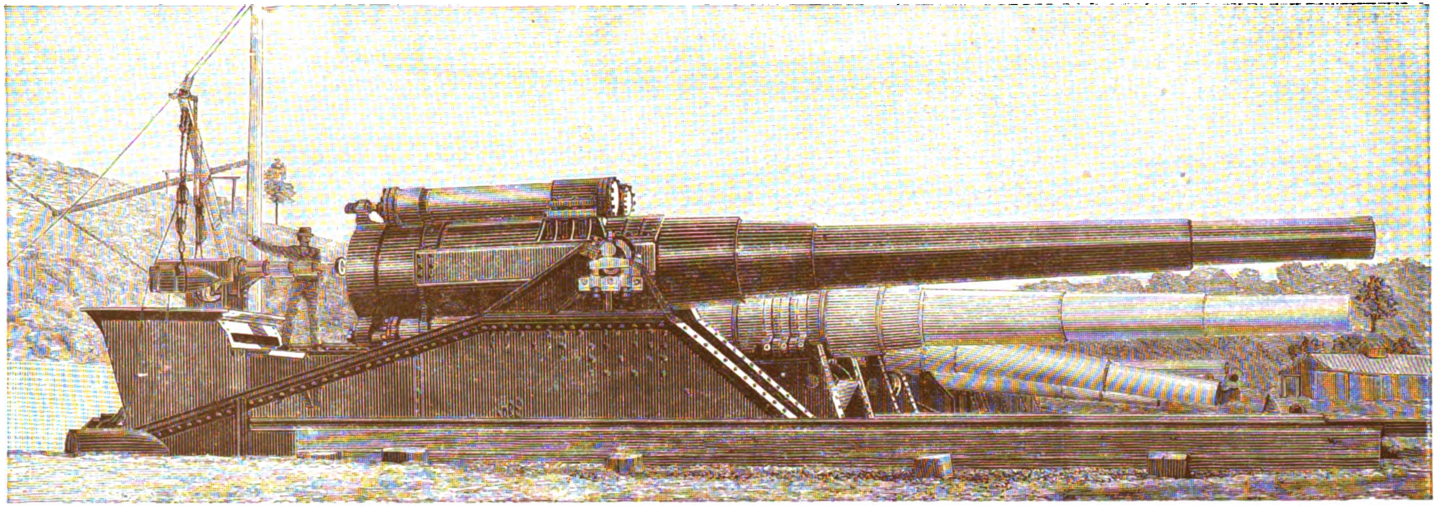
The following table gives the weights and dimensions of the latest guns of the United States Navy; also the character, velocity, and the powers of penetration of the projectiles, and will serve to represent naval guns in general:

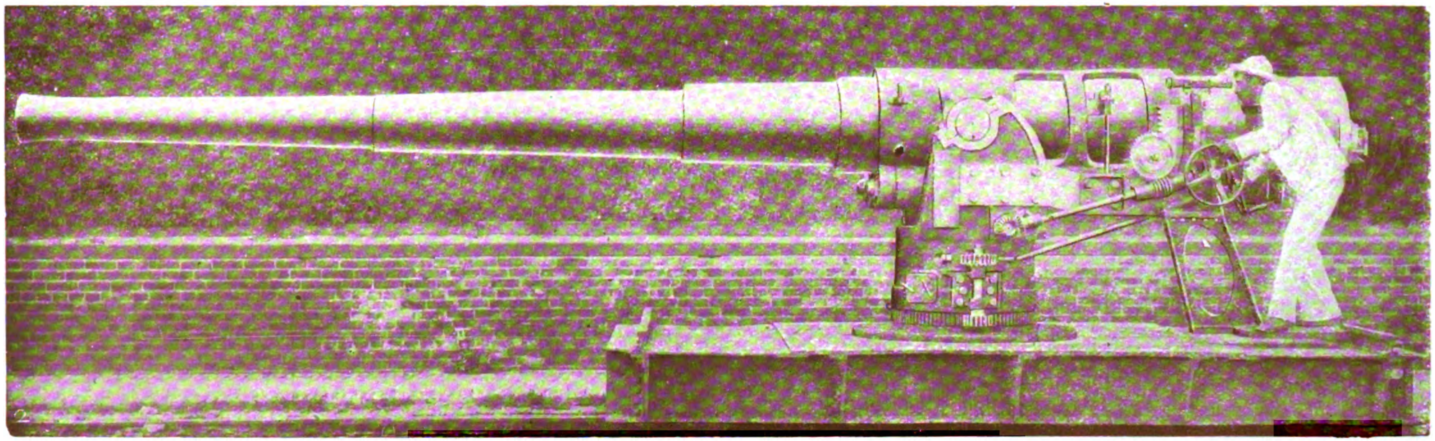
All of them are breech-loaders, and are equipped with rapid-firing breech mechanisms up

TABLE OF ELEMENTS OF LATEST TYPES OF NAVAL GUNS (MODELS OF 1899), GIVING PERFORATION OF FACE-HARDENED ARMOR, SERVICE VELOCITIES, AT RANGES UP TO 3,000 YARDS, WITH SMOKELESS POWDER, CAPPED AND UNCAPPED, ARMOR-PIERCING PROJECTILES, AT NORMAL IMPACT.

CALIBRE OF GUN	Weight in tons	Length in calibre	Approximate charge of smokeless powder for maximum velocity	Weight of projectile	Muzzle velocity	Muzzle energy	Perforation at muzzle	
							Krupp armor	
							Projectiles	
							Capped	Uncapped
			Lbs.	Lbs.	Ft.-secs.	Ft.-tons		
3-in., Mark I........	0.87	50	5	13	2,800	709	4.4	3.6
4-in., Mark VII....	2.56	50	15	32	2,900	1,870	6.4	5.6
5-in., Mark V......	3.3	50	27	60	2,900	3,503	8.4	6.6
6-in., Mark VI.....	8.37	50	46	100	2,900	5,838	10.9	7.3
7-in., Mark I.......	13.33	45	74	165	2,900	9,646	13.2	10.5
8-in., Mark V......	18.	45	115	250	2,800	13,602	15.	12.1
10-in., Mark III.....	33.4	40	240	500	2,800	27,204	20.	17.1
12-in., Mark III.....	52.	40	385	850	2,800	46,246	25.	21.7

CALIBRE OF GUN	Remaining velocity at 1,000 yards	Perforation at 1,000 yards		Remaining velocity at 2,000 yards	Perforation at 2,000 yards		Remaining velocity at 3,000 yards	Perforation at 3,000 yards	
		Krupp armor			Krupp armor			Krupp armor	
		Projectiles			Projectiles			Projectiles	
		Capped	Uncapped		Capped	Uncapped		Capped	Uncapped
3-in., Mark I........	2,130	3.1	....	1,620	....	....	....	....	....
4-in., Mark VII....	2,380	5.2	4.4	1,955	4.	3.4	1,605	3.2	....
5-in., Mark V......	2,460	6.7	5.6	2,085	5.5	4.7	1,770	4.6	4.6
6-in., Mark VI.....	2,525	8.8	6.8	2,185	7.2	6.	1,895	5.9	5.2
7-in., Mark I.......	2,580	11.4	8.9	2,295	9.7	7.6	2,040	8.3	6.5
8-in., Mark V......	2,530	13.2	10.4	2,390	11.7	9.1	2,070	10.3	7.9
10-in., Mark III.....	2,585	18.3	15.	2,390	16.5	13.5	2,210	15.	11.5
12-in., Mark III.....	2,620	23.	19.4	2,450	21.2	17.9	2,295	19.5	16.2





Scientific American.

1. Twelve-inch breech loading rifle, coast defense mounting.
2. Six-inch rapid-fire, breech loading rifle.

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to and including those of 8-inch calibre. (See ORDNANCE.) In their design a maximum of efficiency with a minimum of weight is obtained, while the calibre selected is controlled to a great extent by the conditions of their service. The largest guns ever placed on board ship were the Armstrong 110-guns, of the English battleships, Sanspareil, Benbow, and Victoria. They were of 16.25-inch calibre. Many 13.5-inch guns are still used in the English and French navies, and some 13-inch guns in the naval service of the United States, but guns exceeding 12 inches in calibre are not being made for any naval service at the present time. In addition to these larger types, naval armaments include the various forms of rapid-fire and machine guns of smaller calibre, and greater speed of fire, but their precise value as naval weapons is a matter of some controversy. The rifling of naval guns is of the poly-groove type (see ORDNANCE); their projectiles are either of the capped or uncapped variety (see PROJECTILES); and they are fired by electric, percussion, combination, or friction primers. The electric, or the percussion primer, consists of a small copper tube about one and one-half inches in length, with an enlarged head. The electrical contact with the firing circuit is by means of a small projecting wire, while the percussion contact with the powder-charge is a small cap in the head of the primer. The combination primer consists of a small metallic shell somewhat like that of a centre-fire cartridge, containing the priming composition, and fitted with a cap that is insulated from the shell. This cap, if struck, will explode and ignite the powder-charge, or it may be worked by an electric contact; in which case, the current passing through the cap, heats to incandescence the bridge of fine platinum wire connecting the cap with the shell, and thus ignites the composition which explodes the powder-charge in the gun.

The methods of construction, and systems of loading applied to naval guns, are similar to those generally employed in the production and operation of the larger types of ordnance. In the United States navy, all of the guns are equipped with the "interrupted or slotted screw" breech mechanism, improved by the "Welin" patent breech-plug, the rights for which were purchased from the Vickers-Maxim firm, at a cost of several hundred thousand dollars. In this plug, the screw-threads are cut in steps of varying radius in the several sectors, instead of uniform radius with alternate blank and threaded sectors, as in the older form. By this method the amount of the plug cut away is reduced, also the depth of the plug, and consequently the distance it has to be pushed in before it is fully inserted. In all guns up to and including those of 7-inch calibre, the breech is opened with a horizontal lever, one sweep of which unlocks the threads, withdraws the plug, and swings it clear of the breech. (See illustration of breech mechanism of new 6-inch rapid-fire gun.) In the 8-inch rifle and all larger calibres, the breech is opened with a crank, as the plug is too heavy and the swing too great to be operated by a lever. The time consumed in opening and closing the breech, however, is but a small fraction of that required to serve the gun, its loading and pointing are the operations that take the most time.

In the 12-inch gun, the continued turning of the crank rotates and unlocks the plug, withdraws it, and swings it around to the right side of the breech. To open or close the breech requires seven and one-half turns of the crank, easily performed in less than five seconds. The mechanism of the 8-inch gun is practically the same, but being lighter is handled more quickly.

Mounts and Carriages for Modern Naval Guns.— The first important step in the development of modern gun mounting, was the employment of hydraulic cylinders to check the recoil. Very large guns requiring power for their operation, are mounted in turrets or barbettes, and their carriages, until within the last few years, were built on the system originally installed on the English ship Thunderer, in 1877. This type of mounting as used on the first modern armored ships of the United States Navy, consists of a steel slide pivoted to the turret at its forward end, and supported by a hydraulic ram at the rear. This slide carries a movable saddle to which the gun is secured by steel straps, the forward part of the saddle being attached to the piston rod of a hydraulic cylinder secured between the slide rails. Shallow grooves, decreasing in width toward the rear, are cut in the walls of the cylinder. When the gun recoils, the water is forced from the rear side of the piston through the grooves to the front side, absorbing the energy of the recoil and stopping the gun after it had recoiled a distance of about four calibres. A pipe conveys water from a pumping system below the recoil cylinder, entering by an automatic valve which closes when the pressure in the cylinder exceeds the pressure in the hydraulic system. When the gun recoils this valve closes, but opens as soon as the recoil is checked, so that the water pressure returns the gun to battery at once. For loading, the slide is dropped, usually to the position of extreme elevation; a three-storied ammunition car, carrying the projectile in the upper compartment, and half the powder-charge in each of the others, is hoisted in line with the breech by a hydraulic cylinder actuating a wire-rope purchase, and the three parts of the load are pushed into the gun successively, by a hydraulic rammer. The turrets are turned by either steam or electric motors situated on the deck below the turret floor, which operate a pinion geared into a rack fixed to the turret. Since 1880 greater progress has been made in gun-mountings than even in the guns themselves. The first small rapid-fire guns were mounted on tripods, or cone stands, and had no recoil; the shock of the discharge being absorbed by the elasticity of the supports; but, as these guns increased in size and power, it became necessary to allow them recoil, and to do this without greatly reducing their speed of fire, the "cradle" mount was devised This form of mount, now used for all naval guns, consists of a frame or sleeve mounted on trunnions, in which the gun is so fitted that it can slide back and forth. The recoil is checked by hydraulic cylinders, and the gun is returned to the firing position by the expansion of springs compressed by the force of the recoil. As the trunnions are on the sleeve and not on the gun, elevation or depression is given by turning the whole combination of gun, sleeve, recoil cylinders, and counter-recoil springs, around the axis of the trunnions. "Cradle mounts" are also known as "balanced spring return mounts," a designation derived from the fact that in them, the sleeve is balanced at its centre of gravity which coincides with the position of the axis of the trunnions, instead of being supported by a pivot in front and a ram at the rear, as in the older form. All of the guns in the United States Navy, from the 3-inch to the 8-inch calibres, inclusive, recoil in the oscillating sleeve. The recoil of the 8-inch gun is 24 inches, of the 7-inch 21 inches, of the 6-inch 15 inches, and of the 5-inch 11.5 inches. Guns of and below the 7-inch calibre, are mounted on pedestal mounts, turn on ball bearings, and are balanced (at the centre of gravity) in their sleeves. They are worked by the hand and can be elevated or depressed with great ease. In the case of the 6-inch and 7-inch guns, the gun pointer stands on a platform attached to the sleeve and turning with the gun. He is, therefore, unaffected by the recoil and is able to keep the gun steadily upon the target. His position, with his hands on the traversing and elevating hand-wheels, and with his eye at the telescopic sight, is shown clearly in the photograph of the 6-inch gun. All guns above the 3-inch calibre are fitted with telescopic sights, also with open day and night sights, and with electric and percussion firing gear. The recoil of the 12-inch gun, is taken up by four hydraulic cylinders placed symmetrically around the gun, but attached to the sleeve or non-recoiling part. The pistons are attached to a yoke on the breech of the gun. In the 12-inch guns of the Maine and her class, and for the monitors, the recoil is 33 inches. Each recoil cylinder contains a series of heavy triple springs, about 1 ton in weight, which are put into them under an initial tension sufficient to prevent any movement of the gun when the ship rolls, or when it is elevated to its maximum limit. Upon discharge, these springs are still farther compressed by the force of the recoil, and in expanding exert sufficient force to return the gun to the firing position as soon as the recoil is checked. As this force is sufficient to return the gun to battery at extreme elevation, it exceeds the force necessary to return the gun at level. This excess of energy is counteracted by a hydraulic buffer, or counter-recoil check, fitted into the front end of each cylinder, which prevents the gun from being run out violently, and brings it to rest gradually, as it runs out.

The increased speed of fire of modern naval guns is chiefly due to the improved gun-mounts and breech mechanisms described in the foregoing text. The consequent enormous increase in the power of battleships is clearly illustrated by the above table, which gives a comparison of the total energy of fire of the United States battleship Oregon in 1898, with that of the Georgia launched in 1903. The Georgia is a larger vessel; but while the increase in displacement is 40 per cent, the increase in energy of fire is about 340 per cent. This increase, however, is due as much to the greater muzzle energy developed by the new guns as to their increased speed of fire.

COMPARISON OF TOTAL ENERGY OF FIRE IN FIVE MINUTES OF BATTLESHIPS OREGON (IN 1898) AND GEORGIA.

Oregon in 1898				Georgia			
Gun	Muzzle energy of Gun	*Rate of Fire per Minute	Muzzle energy in Five Minutes	Gun	Muzzle energy of Gun	*Rate of Fire per Minute	Muzzle energy in Five Minutes
	Foot-tons		Foot-tons		Foot-tons		Foot-tons
4 13-inch.	33,627	0.4	269,016	4 12-inch	46,246	0.66	610,447
8 8-inch.	8,011	1.0	320,440	8 8-inch	13,602	1.2	652,896
4 6-inch.	2,990	2.0	119,600	12 6-inch	5,838	3.5	1,225,980
20 6-pounders.	138	8.0	110,400	12 3-inch	709	6.5	276,510
Total energy all guns in five minutes,			819,456	Total energy all guns in five minutes			2,765,833

The rates of fire given in the table may appear to be very low, but they represent practical and not ideal values. Rates of fire as high as 8 aimed shots per minute, from a 6-inch gun, all of which struck a target 15 feet high, at a range of 1,500 yards, are of record, but the conditions under which they were attained were undoubtedly ideal. Under actual battle conditions, even the rate of 3.5 rounds per minute given in the table, could be maintained for a few minutes only, as the heating up of the gun alone, would necessitate a rest. In this connection, the "life" or period of effective use of modern guns may be considered briefly, with advantage. Various explanations have been offered for the erosive effects of the escaping powder-gas on the surface of the bore. Some authorities claim that it is of a chemical nature, while others are of the opinion that it is a mechanical action of a scouring character. It is true that a great deal of the injurious effects of gas erosion has been partially eliminated by the use of effectual gas-checks, but what appears to be the principal attendant cause — the high temperature of combustion of the powder-charge — still remains, and indicates the proper direction in which experiments should be made to overcome those effects completely. Large charges of brown powder erode the bore very rapidly. Smokeless powder containing a large percentage of nitro-glycerine, such as "cordite," exerts an erosive action, so rapid that a gun is practically worthless after firing 70 or 80 rounds. On the other hand, the use of pure guncotton smokeless powder, such as used at present by the United States, France, and Russia, in which the temperature of combustion is not only lower than that of nitro-glycerine, but is even lower than that of ordinary gunpowder, shows a decrease of erosive action to a marked degree. In a 3-inch gun, tested at the Indian Head proving grounds, 450 rounds were fired without impairing its accuracy.

It is undoubtedly true that the heating of the gun in rapid firing, in addition to the high temperature of combustion, increases the wear, especially in those of the smaller calibres — 6-pounder and the 3-inch class. In the case of the gun just mentioned, at the end of 450 rounds of slow firing it was practically as good as new, but it was completely destroyed, by the wearing away of its rifling, in one hour, by firing it at the rate of two rounds per minute.

Bibliography.— Specific information on naval guns, may be obtained from the following named publications: Annual Reports of the Office of Naval Intelligence; Annual Reports of the Chief of the Bureau of Ordnance, U. S. Navy Department; Ingersoll, 'Text-Book on Ordnance and Gunnery'; Proceedings of the United States Naval Institute; The Naval Pocket-Book; Brassey, 'Naval Annual'; 'Engineering' (London, current); 'Scientific American' (New York, current).

W. Morey, Jr.,
Consulting Civil Engineer.

Naval Institute, United States, an organization founded in 1873 at Annapolis, Md., by the officers of the Naval Academy. It issues quarterly 'Proceedings' on naval affairs. Each year the Institute offers a life membership, a gold medal, and a prize of $100 for the best essay or paper of interest to the naval service. The present membership includes two thirds of all the officers of the navy.

Naval Law. See Law, Military.

Naval Maneuvers. See Army and Navy Maneuvers.

Naval Militia, armed organizations instituted by many of the States, under an act of Congress, forming a part of the State militia. The duty of the naval militia in time of war is to man the coast and harbor defense vessels, thus leaving free the regular force to carry on offensive operations at sea. Historically the first step may be said to have been taken by the introduction by Senator Whitthorne of a bill in the United States Senate on 17 Feb. 1887, "To create a naval reserve of auxiliary cruisers, officers, and men from the mercantile marine of the United States." This measure did not become a law, but as a result the Navy Department in 1887 prepared a plan of organization for a naval militia force based on a battery of 18 petty officers and men as a unit. The legislature of Massachusetts passed an act, which was approved 17 May 1888, establishing "a naval battalion to be attached to the volunteer militia." This was really the pioneer measure in the United States, but the organization under it was not completed till 25 March 1890. The State of Pennsylvania, under an act approved 26 April 1889, made provision for the establishment of not less than four companies, "to constitute a battalion to be known as the Naval Battalion of the National Guard of Pennsylvania." On the same day the legislature of Rhode Island "established a naval battalion to be attached to the Rhode Island Militia." The legislature of New York passed an act, approved 14 June 1889, to establish a State Naval Militia of three battalions of naval reserve artillery and a naval reserve torpedo corps to consist of not less than four companies to a battalion.

In 1890 little was done except in the way of perfecting the organizations in States which had passed laws. The Massachusetts Naval Battalion drilled on board the receiving ship Wabash and the New York battalion on board the receiving ship Minnesota. The year 1891 was, however, a most important one. On 2 March 1891, Congress appropriated $25.000 for arms and equipments for the Naval Militia, and in June the department issued regulations governing the disbursement of the fund pro rata, one allotment being paid on 1 July and a reserve allotted on 1 October. On 31 March 1891, an act was approved in California for a naval battalion. The governor of North Carolina granted permission for the formation of a battalion of naval artillery, to consist of not less than two batteries, as a part of the National Guard. No law was passed directly authorizing the establishment of a Naval Militia. In the same way the Galveston Artillery Company was ordered by the governor of Texas enrolled as a "battery for seacoast defense," and was recognized by the department as a Naval Militia force in Texas.

In 1893 the following States passed laws relating to the Naval Militia: North Carolina, Michigan, Illinois, Connecticut, and Georgia. In the regulations of the department governing the distribution of the annual appropriation for 1893 "only uniformed petty officers and enlisted men" were hereafter to be considered in making the apportionment, one half of the allotment due any State to be withheld until the governor shall inform the department officially "that a proper naval uniform has been adopted and issued to its Naval Militia." Notice was also given that all arms and equipment issued by the department should remain the property of the United States and should be receipted for and annually accounted for on blank forms furnished by the department.

The following table shows the number of officers, petty officers, and enlisted men in each State and in the District of Columbia on 1 Jan. 1910, as certified to by the governor of the State and by the brigadier-general commanding the District of Columbia militia:

State	Officers	Petty officers and enlisted men
California	44	585
Connecticut	16	224
District of Columbia	14	157
Georgia	3	47
Illinois	50	637
Indiana	18	184
Louisiana	46	602
Maine	3	69
Maryland	17	294
Massachusetts	40	525
Michigan	41	340
Minnesota	11	134
Missouri	10	106
New Jersey	41	350
New York	23	820
North Carolina	52	364
Ohio	32	250
Pennsylvania	7	112
Rhode Island	15	226
South Carolina	19	206
Wisconsin	8	69
Total	485	6,301

All matters relating to the naval militia come under the cognizance of the assistant secretary of the navy. The Navy Department transacts all its business with the naval militia through the governors and adjutants-general of the States.

The following table shows the allotment of appropriations to each State, in conformity with the regulations of the Navy Department:

State	Allotment
California	$6,000
Connecticut	2,250
District of Columbia	1,490
Florida	1,380
Georgia	600
Illinois	5,250
Indiana	2,150
Louisiana	6,010
Maine	1,150
Maryland	2,720
Massachusetts	5,230
Michigan	3,130
Minnesota	2,010
Missouri	2,220
New Jersey	2,990
New York	7,620
North Carolina	3,270
Ohio	2,000
Oregon	2,520
Pennsylvania	1,120
Rhode Island	1,890
South Carolina	1,870
Washington	1,120
Wisconsin	740

Naval Observatory, The United States, a government institution located on Georgetown Heights, Washington, D. C., and constituting a division of the Bureau of Equipment of the Navy Department. Its functions are to prepare charts of the positions of the sun, moon, stars, and planets for publication in the 'Nautical Almanac,' which it has published since 1894; to make general astronomical observations; to test chronometers: to issue standard time every day; and to prepare correct navigation instruments for the vessels of the navy. The Observatory comprises a group of buildings erected on the present site in 1893, the main building containing the offices of the astronomical, nautical instrument, time service, and 'Nautical Almanac' departments.

A national observatory was planned as early as 1810 but little progress toward its establishment was made for many years and it was mainly due to the efforts of Captain James Melville Gillis, U. S. N., that the foundation of the Observatory was finally laid. On 6 Dec. 1830 a bureau for the care of naval instruments and charts was established by the navy commissioners in the western part of Washington. Lieutenant Goldsborough of the navy was the first officer who had charge of the depot (1830) and in the small circular building built for the use of the depot he mounted the first instrument — a 30-inch portable transit instrument made by Richard Patten of New York City. In 1833 Goldsborough was succeeded by Lieutenant Wilkes, who removed the depot to a building on Capitol Hill on the west side of North Capitol street, between B and C streets north. This building was 14 x 13 x 10 feet, and contained beside the original instrument, a transit instrument of 3¾ inches aperture and 6.3 inches focal length, a Borda's circle, a sidereal clock, and a 3½ foot achromatic portable telescope by Jones.

Systematic astronomical observations did not begin till 1838 when the Wilkes expedition started for the South Seas. In that year Wilkes resigned the superintendecy to assume charge of the expedition and turned over the direction of the Observatory to Gillis. In the summer of 1838, by order of the Secretary of the Navy, Gillis purchased a portable achromatic telescope of 3¼ inches aperture and 42 inches focal length, an Ertel meridian circle of 4.5 inches aperture with circles 30 inches in diameter, one of which was graduated to 3 minutes, a sidereal clock, and a mean time clock.

It was not, however, till 12 years after the establishment of the "Bureau of Charts and Naval Instruments" (1830) that a suitable building was provided for use as a national observatory. In 1842 an act was passed by Congress (approved 31 August) appropriating $25,000 for such a building and as it had been mainly due to the efforts of Captain Gillis that the appropriation was made, he was directed to visit the principal observatories of America and Europe for information respecting plans. The building, occupying a site of 17.85 acres between 23d and 25th streets west and from E street north to the Potomac, was completed in September 1844 and on 1 October Lieutenant Matthew F. Maury, on account of his seniority in rank, was placed in charge. The instruments and clocks were removed from Capitol Hill and installed in the new buildings, and further equipment was purchased, consisting of a 9.6 inch achromatic equatorial; a meridian transit of 5 1-3 inches aperture; a prime vertical transit of 4.9 inches aperture; a mural circle with a telescope of 4.1 inches aperture, and a circle 5 feet in diameter divided to five minutes and read by six micrometer microscopes; a comet seeker of 4 inches aperture; magnetic and meteorological instruments; and books. Berlin, Paris, Greenwich, and Vienna presented some 200 rare volumes of the highest standard as a nucleus for a library. This branch has grown from that to one numbering 22,000 volumes and pamphlets, and stands to-day second to Pulkowa only. The publications comprise more than 50 large quarto volumes. The 'Nautical Almanac' was established in 1847 but not until 1894 was it officially published as a part of the work of the Naval Observatory.

On 3 March 1849, Congress appropriated $10,000 to pay Dr. Locke, of Cincinnati, for the construction and use of a magnetic clock, a fillet chronograph, and a cylinder chronograph, which at that time embraced the essential features of those now in use. On 20 April 1861 Maury resigned the superintendency and on the 23d Gillis assumed charge of the observatory, instilling new life in the work and gradually raising the usefulness of the observatory as a national institution. Since August 1865, in accordance with the plan originated by Prof. Harkness, the observatory has transmitted time signals, daily except Sundays and holidays, over the telegraph lines running into the chronometer room. In 1865 a new Pistor and Martins meridian circle of 8.52 inches aperture took the place of the smaller Ertel circle, and in 1873 the famous 26-inch equatorial refractor by Alvan Clark and Sons was placed in position. At that time this was the largest telescope in existence and was placed in position just in time to observe the transit of Venus. In July 1887 a complete magnetic outfit, provided with facilities for obtaining continuous photographic records of declination, inclination, and horizontal force, was turned over to the observatory.

In 1881 a new site on Georgetown Heights was purchased by Congress, appropriations for new buildings were made in 1886, and in the early part of 1893 the buildings were so far completed as to permit of the transfer of the instruments from the old building. The building occupies a site of 69.78 acres on the Heights about 275 feet above the Potomac River, and comprise one office building and a separate cluster for the principal instruments. The main building has a tower for the smaller equatorial on its western end, and still further west an adjoining meridian room, while on its eastern end is the library. The clock room is 410 feet northwest of the main building and it is flanked on the east and west by connecting observers' rooms which contain the chronographs. About 50 feet north of the clock room in the vertical transit house and 175 feet south is the dome of the 26-inch equatorial with two rooms connecting for the astronomers' use. Situated 275 feet northwest of the clock room is a circular wooden building 11.5 feet in diameter, with a revolving dome for the altazimuth instrument, and the horizontal photoheliograph is mounted 400 feet southeast of the clock room. The magnetic observatory is 250 feet south of this, the superintendent's residence is 650 feet north of the main building, and 250 feet southeast of the library are the residences of the professors in charge of the 26-inch equatorial and the 9-inch meridian circle. The main building and the 26-inch equatorial building are of white marble, but the four transit houses are entirely of metal.

In regard to equipment the 9.6-inch equatorial refractor has been replaced by a telescope having a 12 inch object-glass made by Clarke and mounted by Saegmüller and occupies a 26 foot dome on the tower at the west end of the main building. The 26 inch equatorial is provided with a new mounting by Warner and Swasey and a powerful spectroscope by Brashear. Its dome is 45 feet in diameter and it is provided with an hydraulic elevating floor having a range of motion of 12 feet. The Ertel transit is mounted in the meridian room at the west end of the building. The 8.5-inch object-glass of 12 feet focal length on the Pistor and Martins meridian circle was replaced by a 9.14 inch Clarke object-glass of 107 inches focal length and the instrument was otherwise modified. Two new instruments were added: (1) a steel meridian circle of 6 inches aperture with two circles 26 inches in diameter graduated to two minutes and provided with two horizontal collimators 3.5 inches in aperature, a vertical collimator and a north meridian mark distant 380 feet. (2) A steel altazimuth of 5 inches aperture by Warner and Swasey, the diameter of its vertical and horizontal circles being 26 inches each, graduated to two minutes.

The superintendents have been as follows:

Lieutenant M. B. Maury	1 Oct. 1844 — 20 April 1861
Captain J. M. Gillis	23 April 1861—9 Feb. 1865
Rear Admiral C. H. Davis	28 April 1865—8 May 1867
Commodore B. F. Sands	8 May 1867—11 Feb. 1874
Rear Admiral C. H. Davis	16 Feb. 1874—18 Feb. 1877
Rear Admiral John Rodgers	1 May 1877—5 May 1882
Vice Admiral S. C. Rowan	1 July 1882—1 May 1883
Rear Admiral R. W. Shufeldt	1 May 1883—21 Feb. 1884
Commodore S. R. Franklin	21 Feb. 1844—31 March 1885
Commodore G. E. Belknap	1 June 1885—7 June 1886
Captain R. L. Phythian	15 Nov. 1886—28 June 1890
Captain F. V. McNair	28 June 1890—21 Nov. 1894
Commodore R. L. Phythian	21 Nov. 1894—19 July 1897
Commodore C. H. Davis	19 July 1897—1 Nov. 1902
Rear Admiral Colby M. Chester	1 Nov. 1902—28 Feb. 1906
Rear Admiral Asa Walker	28 Feb. 1906—13 Nov. 1907
Rear Admiral W. J. Barnette	13 Nov. 1907—19 April 1909
Commodore T. E. De Witt Veeder	20 April 1909—

Recently great changes have occurred in the scientific staff of the institution by the retirement of the older professors, notably Asaph Hall in 1891 and Simon Newcomb in 1897, and the succession to their responsibilities of a younger staff comprising Profs. Skinner, Updegraff, Eichelberger, Littell and Harshman, the last of whom was appointed director of the 'Nautical Almanac' on 28 March 1901. Consult Skinner, 'The United States Naval Observatory' ('Science', vol. 9, pp. 1-16, 6 February 1899); Hill, 'The Naval Observatory Report' ('Science', vol. 14, pp. 945-965, 20 December 1901); Chester, 'Work of the Naval Observatory' ('Proceedings of the U. S. Naval Inst.' vol. 30 pp. 265-288, June 1904).

Naval Order of the United States, an association composed of a General Commandery and commanderies in the States of Massachusetts, Pennsylvania, New York ,and Illinois, and in the District of Columbia. The General Commandery meets triennially on 5 October, and the State Commanderies meet annually in November. The parent commandery, that of Massachusetts, was organized at Boston on 4 July 1890. The General Commandery was established three years later, on 19 June 1893. The members of the order are officers and the descendants of officers who served in the navy and marine corps in any war or in any battle in which the said naval forces of the United States have participated.

Naval Reserve. See NAVAL MILITIA.

Naval Schools, institutions for the training of naval officers. In the United States the Naval Academy at Annapolis, Md., is the most important school of this character. In Great Britain the chief naval school is the Royal Naval College at Greenwich. See NAVAL ACADEMY, UNITED STATES; NAVAL SERVICE.

Naval Service, The. For a period of ten years after the close of the Civil War the officers of the navy met with many difficulties in keeping up the well-earned reputation of our naval vessels, because of the very inferior class of men composing the crews. The percentage of Americans in the service was small, and it was no unusual circumstance to have the powder division of a ship made up almost entirely of foreigners, who could neither understand nor speak the English language. The intelligent officers of our navy could not be content with this anomalous condition of affairs, and constantly suggested improvements, many of which were from time to time adopted; but the betterment of our enlisted force was very gradual, and not until toward the dawn of the 20th century were the present high standards reached.

It must be remembered that the work of the navy differs from that of all other callings, by reason of the fact that nothing counts except results. In battle or in target practice, the shot that does not hit is absolutely wasted. The engine that cannot develop the speed for which it was designed may prevent a warship from performing the mission upon which she is sent. The officers who do not show efficiency and patriotism are not suitable representatives of their country in foreign harbors. The commander of a fleet or vessel who in time of emergency is wanting in diplomatic ability lacks one of the essentials of a naval leader. In peace or in war, nothing but perfect discipline and the highest efficiency will suffice, and it is for this reason that the navy cannot content itself with indifferent work. It does not require a war to bring naval weakness to the attention of the country.

The whole aim and purpose of every man in the navy should be to cultivate strong and lasting friendships among his fellows, to influence men to be fearless in the discharge of their duty, and to do everything that will produce efficiency at all times. There is something in the naval life that helps to bring out the best a man has in him. The sea has a tendency to make all men feel their nothingness, and it is not surprising that where men have in common shared triumphs, endured perils, seen the wonders of the deep, and at times felt the presence of a stronger controlling power, they become bound by ties which make them love each other like brothers.

The new navy, as it has been called, means not only great engines and machines of war, and floating fortresses, but it means the proper training of young men for the profession of fighting upon the sea. While the early establishment of the Naval Academy had a wondrous effect upon the efficiency of the American navy, there had been felt for half a century a need for a preparatory system to properly fit young men for service in the enlisted force. It was about 1870 that the success of the apprentice system in some of the European navies became so marked as to indicate an effective solution of the problem of the education of sailors. So impressed was Secretary Robeson with the desirability of this system that in April 1875 he issued a circular directing that the education of boys for the navy should comprise only the elements of an English education, alternating with practical seamanship and other professional occupations designed to make of them sailors in the navy. In accordance with this idea, the two frigates Minnesota and Constitution and the sloops Portsmouth and Saratoga were commissioned as school and training ships. To-day the qualifications for admission as apprentices are almost identical with those of 1875, except that the limit of age at time of entrance has been raised, being now 14 to 18 years. Each boy must satisfy the recruiting officer that he is of robust frame, intelligent, of perfectly sound and healthy constitution, and that he is able to read and write. In special cases, where the boy shows general intelligence and is otherwise qualified, he may be enlisted even though his reading and writing are imperfect. Boys are enlisted on the receiving ships at the navy yards and are sent as soon after enlistment as practicable to one of the training stations maintained for their education.

In 1880 the people of Newport ceded Woonachasset, or Coaster's Harbor Island, to the State of Rhode Island, and in March 1881 the State ceded title and jurisdiction over the island to the United States, for use as a training station. In August of the following year Congress accepted "the cession by the State of Rhode Island to the United States of said island for use as a naval training station." The old ship New Hampshire was taken to Coaster's Harbor Island in 1881, was housed in, heated by steam, lighted by electricity, and fitted out for comfortably accommodating 500 apprentices. They slept in hammocks, assisted in keeping the ship clean, and in various ways were gradually accustomed to a nautical life. The daily routine began at 5:30, when reveille was sounded and hammocks were lashed and stowed. After an early breakfast the boys washed their clothes, scrubbed decks, and bathed. About six hours each day were occupied with studies and drills. Tattoo was sounded at 9 o'clock, when all boys were required to be in their hammocks.

As time has gone on, various changes have been made in the training of apprentices, but the results of the adoption of the apprentice system have been very satisfactory, and in recent years another training station has been established in San Francisco harbor, and another on the Great Lakes is contemplated. Three departments of instruction are maintained, namely, seamanship, gunnery, and English. The apprentice remains at the training station for at least six months, during which time, even with the very limited number of instructors, the average boy learns more about his future profession than the average landsman on a man-of-war does in a three years' cruise. Several line officers are attached to the training station, and supervise the discipline and instruction. Warrant officers give technical instruction in their specialties, and a chaplain looks after the moral training of the boys. Twice each year the boys are drafted to the training ships, which make summer cruises to Europe and winter cruises to the West Indies. Only half of the crews are changed at a time, and each apprentice remains on board for a year. This duty at sea is supposed to transform the boys into deep-water sailors. Their former instruction is continued, but the boys acquire, through their sea duty, development of physique, knowledge of sailing ships, perfect fearlessness, and activity in the performance of their duties. After the completion of their terms on the training ships, the apprentices are transferred to regular men-of-war, where their education is still continued; and when they have shown a proper aptitude they are sent to the Washington navy yard for a six months' course of instruction in gunnery. A limited number of them are afterward sent to Newport for an equal length of time, to be given a practical working knowledge of electricity and torpedoes. They then graduate into the service as seamen-gunners, and are insured petty officers' positions with much better pay.

The importance of the apprentice system, together with the thorough means taken to secure the best possible results at Annapolis, cannot be overestimated when it is considered that there must be assigned to every modern warship a large complement of highly trained and educated officers, as well as a skilled and resourceful crew. There must be among the enlisted force a large percentage of men who receive high pay and who are accorded respect and consideration. The average pay of men on board a warship is twice that received by troops in barracks or in camp. The opportunity for professional advancement is greater on shipboard than on shore. The man who possesses technical skill, application of purpose, and power of resource, will be certain of quick promotion and increased pay. The call for petty officers is always urgent, and nearly all commanding officers are willing to give high-class men advancement every six months, and in some cases at shorter intervals. Some of the warrant machinists now in the navy, receiving $1,500 per annum, secured their appointments in less than two years from the time they entered the naval service.

In 1901 Congress passed a law providing that a limited number of warrant officers having six years' service as such, and who could pass the examination prescribed by the Department, might secure commissions in the naval service. The opportunity presents itself, therefore, for an apprentice boy to rise, through the various positions in the enlisted force, to the line of the navy and eventually to become the commander of a fleet. A career in the navy gives every officer an opportunity to specialize along lines in which he may possess particular ability. The opportunity also presents itself, through travel and observation, to acquaint himself with the strength and weakness of other nations, to acquire their languages, and to read their literature. Moreover, service in the navy does not unfit either the enlisted man or the commissioned officer for a business career. There are now in civil life thousands of business and professional men who have served on American men-of-war.

Turning now to another viewpoint, it should be said that patriotism, love of the flag, and pride of country are in themselves sufficient to inspire a man to succeed in the American naval service. The War of the Revolution, the War of 1812, the Mexican war, the great Civil War, and the late Spanish-American war, all join in telling the story of the American navy. Immediately upon entering the service in any capacity, one feels instinctively the pride and glory of the history of our flag on the seas. He becomes a participant, in thought at least, in the victories of the past, and pride and patriotism find an abiding place in his heart. And as science in warfare advances, the man behind the gun, the man on the deck, or the man in the engine room, feels that he too is making advances no less important to him than the march of science and invention to the service and the country.

It was through the necessities of the Civil War that the impetus came for naval construction and the beginning of the evolution of the modern war vessel. A new era dawned for the Navy in 1883, when the Atlanta, Boston, Chicago, and Dolphin were laid down and became a nucleus for our present navy. Since then ships have been added on improved plans and with improved machinery. «A duel between guns and armor,» as Rear-Admiral Melville has aptly termed it, has been constantly going on; and as fast as a ship is built and armored on plans far surpassing the preceding one, valuable improvements are suggested and adopted for her successor which render her relatively out of date. The latest American cruiser is a marvel. In speed, ability to keep the sea, and striking power, she is the equal of anything that floats. When we to-day compare our navy with those of foreign nations, it must be confessed that the comparison is a pleasing one from the standpoint of the United States; especially when we remember that comparatively few years ago our navy, in the modern sense of the term, did not exist. To-day the United States and Germany appear to be of equal strength, considered numerically; but when we look at the offensive and defensive power of the battleships which we now have under construction, it must be admitted that, in spite of the large building programme which Germany has in hand, the fighting strength of our navy is to-day a little greater than that of Germany.

With one of the best navies in the world, America demands the best men to man her ships,— men of character and sterling worth; and to such men the navy offers golden opportunities. And what is demanded of them in return? The first thing a recruit learns upon joining a naval vessel is the necessity of implicit obedience. The enlisted man who tries to do his duty suffers very little from the yoke of discipline. In fact, it is a protection to the man disposed to do his duty, since severe measures are only taken against those inclined to disobey established rules and regulations. Great changes have been wrought during the last thirty years, and therefore the new navy offers quite a different career from that which presented itself in the past, and one from which no American citizen need shrink. The naval man of the new age must keep all his senses on the alert; his ear must be trained to detect any variation in the rhythmic beat of the pistons and propellers; his eye must note any leakage of water or vapor or any change in conditions; his touch must be sensitive to the temperature of the working parts; and even his tongue must be a monitor in helping to maintain the freshness of the water in the boilers. The old organization passed away with the old ships, and, as President Roosevelt has said, «the naval officer of the future must be a fighting engineer.» Therefore a career in the navy, for the majority of those who are connected with the service, must be along mechanical lines. The naval conflicts of the future will doubtless be short, sharp, and decisive. Men of intelligence, quickness, alertness, and resource, rather than of great brawn and muscle, are needed on the forecastle as well as in the cabin and wardroom; below decks as well as in the conning tower; in the lowest position as well as in the most exalted office. And every man, performing fearlessly the duty assigned him, will remember that wherever he goes there floats over him the flag of «Old Glory» that must at all times and forever be honored, revered and loved.

George Dewey,
Admiral of the Navy.

Naval Signals. See Signals, Naval.

Naval Squadron. See Naval Fleet.

Naval Stores, or **Ship Stores,** a general term used in commerce and in the merchant marine, for certain products of the pine tree, including spirits of turpentine, resins, pitch, tar, etc. The term is a misnomer in these days of steel and iron ships, as nine tenths of the product are used in other industries rather than in shipping. The name naval stores is derived from the consumption in early days of large quantities of pitch and tar in ship yards and on board of vessels. Nine tenths of the naval stores used throughout the world come from the long-leafed pine belt of the Southern States. The pine belt includes a vast territory commencing in North Carolina, near the Virginia State line, and extending southward to

Florida, along the Atlantic Coast line. The belt is from 5 to 100 miles wide and includes the States of North Carolina, South Carolina, Georgia, Alabama, Mississippi, and Louisiana. The territory embraces about 130,000 square miles. The other tenth of the world's supply comes from France and Austria.

Turpentine.— Spirits of turpentine is derived from the sap of the long-leafed pine and in its crude state is of a fine white color. Upon exposure to the air it becomes dry, hard, and brittle, thus forming resin. From 200 acres of pine trees there is obtained the first year about 280 barrels of crude turpentine, or dip; and 70 barrels of what is known as scrape. This distilled will give 2,000 gallons of spirits of turpentine and 260 barrels of resin. In the fourth and last year of the sap flow this output is reduced to 1,000 gallons of turpentine and 110 barrels of resin. In the days of the Civil War turpentine sold at $1.75 to $1.90 a gallon, as against the normal price of 28 or 30 cents; and inferior resin sold as high as $4 a barrel, the normal price being about $1.90. These Civil War prices boomed the industry in France for several years. (See TURPENTINE.)

Pitch.— The ordinary pitch of commerce is derived from a dry distillation of resin, and is largely used in calking wooden ships. (See TAR.)

Tar.— The variety of tar known as wood tar which is made from the pine sap (see TAR) is produced almost entirely in North Carolina. A cord of pine wood will produce 40 gallons. Wilmington, N. C., is the headquarters for the world's supply of tar and crude turpentine.

Statistics.— The city of Savannah, Ga., is the largest market in the world for naval stores. The output in the United States amounts to $10,000,000 annually. In 1900, the pine belt of the Southern States produced 340,000 casks or 17,000,000 gallons of spirits of turpentine, and 1,400,000 barrels of resin. The exports in a single year amount to over 250,000 casks. To produce these so-called naval stores 2,300,000 acres of pine forests are worked annually, and over 800,000 acres of virgin forest are invaded every year. The one great detriment to the industry is fire, and it has been estimated the annual loss from fire in the pineries will amount to $1,000,000. In South Carolina alone the turpentine industry employs over 7,000 workmen. There are 290 stills in the State, with a capital invested of $1,454,800, and an annual production valued at nearly $3,000,000.

Naval Tactics. See TACTICS, NAVAL.

Naval Veterans, National Association of, a patriotic society founded by delegates from the various associations of naval veterans throughout the Union at a meeting held in the city of New York, in January 1887. The object of the National Association is:

> To cherish the memory and associations of the war of the late rebellion, to perpetuate the glorious names and deeds of our navy, to strengthen the ties of fraternal fellowship and sympathy, to advance the best interests of this association, and to extend all possible relief to the widows and orphans of members; to foster the cultivation of naval science; to encourage the building of an efficient navy and national defenses; to enforce unqualified allegiance to the general government; to protect the rights and liberties of American citizenship, and to maintain national honor, dignity, union, and independence.

Any officer, appointed or enlisted man who has served in the United States Navy, United States Marine Corps, or United States Revenue Marine Service during any portion of the time between 12 April 1861 and 25 Aug. 1865, who has not borne arms against the United States, or been convicted of any infamous crime, and who has been honorably discharged or resigned by an honorable acceptance of resignation, is eligible to membership in this association. There are 39 local associations under the national charter, a paid membership of over 7,500, and 3,000 contributing members.

Naval War College. See NAVY OF THE UNITED STATES.

Navarino, nä-vä-rē'nō, or **Pylos,** pī'lŏs, Greece, a seaport town on Navarino Bay, on the southwest coast of the Morea. Its official name is Pylos, ancient Pylos, the city of Nestor, now called Palæokastro and Palæo-Navarino, being at the north extremity of the bay. The Bay of Navarino was the scene of a great sea-fight between the Athenians under Cleon and the Spartans, 425 B.C. From 1492 to 1821, the town was in the possession of the Turks, when it was taken by the Greeks. The Turks recaptured it in 1825, and retained it until on 20 Oct. 1827 in Navarino Bay the Turkish and Egyptian navy of 89 ships was annihilated by 24 ships of the combined British, French, and Russian fleets under Sir Edward Codrington, the British admiral. Pop. (est.) 3,000.

Navarre, nạ-vär', Spain, a northern province, formerly, with a portion of the department of Basses-Pyrénées, France, constituting the ancient kingdom of Navarre. The province has an area of 4,046 square miles; the surface generally is mountainous and bleak, but in the valleys, and along the river banks, the soil is fertile, producing wheat, maize, barley, and oats. The principal rivers are the Aragon, Arga, Ebro, and Bidassoa. The mineral wealth comprises iron, copper, and rock salt. The chief towns are Pamplona, the capital, Tudela, Olite, and Estella. Pop. of province about 315,000. Navarre was inhabited at an early period by the Vascones, who were expelled by the Romans. It was seized by the Visigoths in 470, invaded by the Saracens early in the 8th century, and fell under the sway of Charlemagne in 778. It became an independent state in 855. In 1035 Navarre was divided into three kingdoms — Navarre, Aragon, and Castile. The first two became united in 1076, and again separated in 1134. In 1285, it became an appanage of France, but recovered its independence in 1328. Ferdinand conquered it in 1512. The estates of Navarre took the oath of allegiance to him in 1513, and it was incorporated with Castile in 1515. After this act of spoliation, there remained nothing of the ancient kingdom of Navarre beyond a small territory on the north side of the Pyrenees, which was subsequently united to the crown of France by Henry IV. of Bourbon, king of Navarre, whose mother, Jeanne d'Albret, was granddaughter of Queen Catherine; and hence the history of Navarre ends with his accession to the French throne, in 1589, the French monarchs, however, until Charles X., being called also King of Navarre.

Navarrete, Juan Fernandez, hoo-än' fĕr-nän'dĕth nä-vär-rā'tā, Spanish painter: b. Logroño about 1526; d. Toledo 1579. He was known as 'El Mudo,' the mute, being deaf and dumb. He imitated the monk painter of the Milanese school, Fra Vicente; he then devoted himself almost entirely to the study of Titian, whose style and coloring he reproduced so successfully that he became known as the «Spanish Titian.» Philip II. appointed him his court painter and much of this artist's best work was done in decorating the Escorial. Titian's influence is evident in a 'Birth of Christ'; a 'Holy Family'; and a 'Scourging of Christ' in the Escorial (1571–5), which have exercised a profound influence on the development of technique in Spanish painting.

Navarro, na-văr'ō, **Madame.** See Anderson, Mary Antoinette.

Navarro, Pedro, pā'drō nä-vä'rō. Spanish general: b. Spain 1446; d. Naples, Italy, 1528. He was engaged with Gonsalvo de Cordova in the Naples campaign of 1500 and made such skilful use of mines as to influence largely the outcome of the war. For this service he was created Count of Alvetto and given command of a naval expedition against the Moors. He was taken prisoner by the French in 1512 and despairing of being ransomed he joined the French army. In an attack upon Naples he was again captured and died soon after.

Navas de Tolosa, Las, läs nä'väs dā tō-lō'sä, Spain, a village of Jaen province, 38 miles by rail north of Jaen, which owes its celebrity to the defeat near here of the Moorish army under Mohammed ibn Abdallah 16 July 1212, by the Spanish troops commanded by Alfonso VIII., assisted by an army of French and English crusaders. In the vicinity also, a battle was fought between the Spanish and French in 1812.

Navassa, nä-vä'sä, West Indies, a small island off the southwest coast of Haiti; about two miles long and one and one-half miles wide; altitude, 300 feet. High bold cliffs border nearly all the shore. In 1857, Peter Duncan, an American, discovered on this island a deposit of guano estimated to amount to 1,000,000 tons. According to an act of Congress, passed 18 Aug. 1856 relative to the discovery of guano deposits on unclaimed islands, it was decided that the island of Navassa should be considered «as appertaining to the United States.» In 1889 trouble arose among the workmen on the island, and one man was killed in «the Navassa Riot.» The murderer was tried by the courts under jurisdiction of the United States, and finally sentenced to be hanged. The question of jurisdiction was the only point in the case which caused delay; the sentence, in 1891, was commuted to imprisonment for life.

Nave, in Gothic architecture, that part of an ecclesiastical edifice to the west of the choir, and in which the congregation assemble; the part of a church between the aisles. See Architecture.

Navesink (năv'ē-sĭnk) **Highlands,** a low range of hills, in Monmouth County, New Jersey, south of Sandy Hook, and at the mouth of Navesink River. Mount Mitchell, the highest point, is nearly 300 feet above sea-level. On an elevation, 195 feet, stands a lighthouse with two towers 100 feet apart and 53 feet in height. In each tower is a fixed white light. The Highlands are an important landmark to ships approaching «The Narrows,» and the region in this part of New Jersey is a favorite resort for residents of New York.

Na'vew, or Naphew. See Turnip.

Navic'ular Disease. See Horse, Diseases of the.

Navidad, La, lä nä-vē-dād', the name of a fort built by Columbus in 1493 on the coast of Haiti, and which was the first Spanish settlement in the New World. Here he left a company of between 30 and 40 men, but on his return in November of the same year found they had all been killed by the Indians and the fort destroyed. See Columbus.

Navies of the World. Naval authorities disagree as to the relative positions of the United States and the other Powers in their naval strength. In his 1910 *Naval Year Book* Mr. Pitman Pulsifer gives to the United States second place in naval strength. Great Britain is first, and the United States, Germany, France, Japan, Russia and Italy follow in the order given. This is the relative strength found by Mr. Pulsifer; both in vessels completed and in another estimate of vessels completed and authorized. In the official table of sea strength prepared by the office of Naval Intelligence of the Navy Department, Germany is put in second place and the United States is third, if naval vessels of all classes be included. It should be stated in favor of the United States that her navy is the youngest navy in the world, its modernization dating only from the mid-80's.

The «Dreadnought» strength of the three leading countries is, 1910: England, 27, with a displacement of 558,000 tons; Germany, 17, displacement 357,000; United States, 10, displacement, 221,650 tons.

The following summary gives the naval strength of the leading nations of the world as reported in 1910:

Argentine Republic.— Battleships, 3; armored cruisers, 4; protected cruisers, 3; armored gunboats, 2; torpedo gunboats, 2; torpedo boat destroyers, 3; torpedo boats, 8; submarine boats, 1.

Austria-Hungary.— Battleships (modern), 10; armored cruisers, 3; protected cruisers, 6; torpedo vessels, 7; torpedo boat destroyers, 12; torpedo boats, 59; submarine boats, 6.

Belgium.— Has no navy, except 1 small ship engaged in fisheries protection, and a few shallow-draught gunboats in Africa.

Brazil.— Battleships (large), 2; battleships (small), 3; protected cruisers, 4; torpedo gunboats, 5; torpedo boat destroyers, 10.

British Empire.— Battleships (new), 48; battleships (old), 13; armored cruisers, 16; armored cruisers (small), 16; protected cruisers (class 1), 19; protected cruisers (class 2), 20; protected cruisers (class 3), 15; torpedo gunboats, 25; torpedo boat destroyers, 190; torpedo boats, 110; torpedo ships, 1; submarine boats, 65.

Bulgaria.— Torpedo boats (large), 6; torpedo boats (small), 2; cruisers, 1.

Chile.— Battleships, 1; armored cruisers, 2; protected cruisers, 4; torpedo destroyers, 7; torpedo boats, 5; monitors, 1.

China.— A complete reorganization of the navy upon modern lines is being planned (1910). The fleet is now far from efficient. It consists of 1 second-class and 3 third-class cruisers, 10 torpedo gunboats built in Japan, and a miscellaneous assortment of old and obsolete craft.

Colombia.— Cruisers, 5; gunboats, 3, and a few boats of miscellaneous kinds.

Costa Rica.— Torpedo boats, 1; gunboats, 1.

Denmark.— Battleships, 1; cruisers (small), 1; torpedo gunboats, 3; torpedo boats, 14; monitors, 4.

Ecuador.— Torpedo boats, 1; transports, 1.

Egypt.— A few river gunboats.

France.— Battleships ("A"), 16; battleships (coast defence), 9; armored cruisers (large), 13; protected cruisers (new and large), 12; protected cruisers (small), 16; protected cruisers (old), 12; torpedo gunboats, 14; torpedo boat destroyers, 65; torpedo boats (class 1), 38; torpedo boats (class 2), 279; submarine boats, 58.

German Empire.— Battleships, 25; battleships (old), 4; battleships (coast defence), 7; armored cruisers, 10; protected cruisers, 32; torpedo boat destroyers, 93; torpedo boats, 47; submarine boats, 8.

Greece.— Battleships, 3; torpedo boats, 19.

Guatemala.— Has no navy.

Haiti— Cruisers (class 3), 6; gunboats, 1; sloops, 2.

Honduras.— Gunboats, 1.

Haiti.— Cruisers (class 3), 6; gunboats, 1;

Italy.— Battleships, 8; battleships (old); 6; armored cruisers, 8; protected cruisers, 14; torpedo gunboats, 13; torpedo boat destroyers, 21; torpedo boats, 37; torpedo boats (old), 54; submarines, 7.

Japan— Battleships, 11; battleships (old), 68; armored cruisers, 13; protected cruisers, 17; torpedo gunboats, 6; torpedo boat destroyers, 54; torpedo boats, 50; submarines, 10.

Liberia— One gunboat and 1 unarmored steamer.

Mexico.— Cruisers, 2; despatch vessels, 2; gunvessels (unarmored), 2; gunboats, 4.

Montenegro.— Has no navy.

Morocco.— Has practically no navy.

Netherlands (*The*).— Battleships, 8; cruisers, 7; protected gunboats, 1; torpedo boats, 50; gunboats, 26; monitors, 1; submarine boats, 1.

Nicaragua.— Eight small steamboats.

Norway.— Protected cruisers, 4; gunboats, 3; torpedo boat destroyers, 3; coast-service monitors, 2; torpedo boats, 29; submarine boats, 1.

Panama.— Has no navy.

Paraguay.— One small despatch boat and 2 steamers.

Persia— Eight small vessels.

Peru.— Cruisers (modern), 2; cruisers (old), 1; despatch boats, 1.

Portugal— Armored cruisers, 1; protected cruisers, 5; gunboats, 19; corvettes, 1; torpedo gunboats, 1; torpedo boats, 10; torpedo boat destroyers, 2; river gunboats, 16; scouts, 1; submarine boats, 2.

Rumania.— Protected cruisers, 1; gunboats, 7; coast-defence vessels, 6; torpedo boats, 8; despatch boats, 1.

Russia.— Battleships, 10; battleships (old), 3; battleships (coast-defence), 1; armored cruisers, 6; protected cruisers, 8; torpedo gunboats, 7; torpedo boat destroyers, 97; torpedo boats, 98; submarine boats, 23.

Salvador.— One small cruiser.

San Domingo.— Gunboats, 1; cutters (small), 4.

Servia.— Steamer, used on military service, 1.

Siam.— Torpedo boat destroyers, 1; torpedo boats, 3; miscellaneous craft, 22 boats.

Spain— Battleships, 1; armored cruisers, 2; protected cruisers (large), 1; protected cruisers (small), 5; torpedo boat destroyers, 5; torpedo boats, 6.

Sweden.— Armored cruisers, 1; coast-defence battleships, 12; torpedo gunboats, 5; torpedo boat destroyers, 8; torpedo boats, 55; coast-service monitors, 10; submarine boats, 4.

Switzerland— Has no navy.

Turkey.— Battleships, 10; cruisers, 2; torpedo gunboats, 4; torpedo boat destroyers, 5; torpedo boats, 38.

United States.— Battleships, 4; battleships (class 2), 25; coast-defence vessels, 25; armored cruisers, 12; cruisers (class 1), 5; cruisers (class 2), 14; cruisers (class 3), 11; torpedo boat destroyers, 28; torpedo boats, 28; submarine boats, 19.

Uruguay.— Gunboats, 2; despatch boats, 1.

Venezuela.— Gunboats, 3; torpedo boats, 1.

See also NAVAL ARCHITECTURE; NAVY, HISTORY OF; NAVY OF THE UNITED STATES, THE; NAVAL SERVICE, THE.

Navigable Rivers. See RIVER.

Navigation, The Science of Modern. At sea, with no land in sight, there are two methods available to the navigator for finding where his vessel is,— by «dead reckoning,» and by «observation» of the heavenly bodies.

Dead reckoning consists in applying to the last accurately determined position of the vessel the «run» that has since been made good, and regarding the position thus obtained as the most probable one at the instant under consideration. The positions regarded as accurately determined and upon which future dead reckoning is based are such as are obtained from terrestrial objects before losing the land, or by astronomical observations; each time there is a new determination of position it affords a new basis, or «departure,» for the dead reckoning. If a vessel known to be in lat. 45° 0′ N., and lon. 25° 0′ W., steers thence to the northward and eastward until, according to the best methods of reckoning course and distance, she has arrived at a point 45 minutes farther north and 30 minutes farther east, the position by dead reckoning is 45° 45′ N., 24° 30′ W. Tables computed ready to hand for the navigator's use give, at a glance, the distance to north or south and to east or west corresponding to each distance on each course; for instance, if the vessel runs 30 miles to the east-northeast, the equivalent is shown to be 11.5 miles north and 27.7 ~~miles ea~~st.

The unit of distance used at sea is the nautical mile, or «knot,» of 6,080 feet, which is about 1 1-7 land or statute miles; this is practically equal to one minute of latitude over all the earth, hence its adoption affords great facility in computations; the exact length of a minute of latitude of course varies by a few feet, at different distances from the equator, on account of the earth's flattening at the poles, but this mean value answers closely enough for navigating purposes, and when the ship makes a knot or «northing» or «southing» the navigator may consider that he has made a minute of latitude wherever he may be, and for 60 of them, a degree. Not so, however, with longitude, for the distance between meridians, and subsequently the length of a degree or a minute of longitude, grows less as we approach the poles; at the equator the minute of longitude and minute of latitude are equal; but as one travels north or south from the equator conditions change; if a man were standing upon the North Pole he might, by a whirl upon the heel, make the circuit of all the earth's longitudes, while it would take a journey of about 25,000 miles to accomplish the same thing at the equator; for intermediate latitudes, there is an intermediate relation of the minute of longitude to the knot, a knot being, for example, 1.1 minutes of longitude at the 30th parallel and two minutes at the 60th. All of these different values are tabulated in navigation books, in convenient form, so that this unaccommodating feature of the longitude is not such a bugbear to the seafarer after all.

The dead reckoning obviously depends for its accuracy upon the correctness with which the mariner knows, first, the course, or direction in which the vessel has moved, and, secondly, the distance run; and it is the course and distance «over the ground» that should be considered, for a knowledge of the ship's progress through the water will not suffice for exact results if the water itself has been in motion. From this it may be understood that errors are always to be expected in dead reckoning, due to inaccuracies in estimating the course and the distance sailed, and to the effect of the unknown movement of the sea itself, that is, the «current.»

To obtain the course, or direction, sailed, the compass is the sole source of knowledge. It may be considered that this is quite sufficient, and so it is when thoroughly understood; but the compass is not the simple and obedient servant of the mariner that it is ordinarily credited with being. «True as the needle to the pole» may be outrageously false, and usually is. The pole that the free magnetic needle seeks is the earth's magnetic pole, situated in Arctic North America, not the geographical one to which we are accustomed to refer; hence the needle points at an angle from the true north which depends upon the relative directions of the two poles at the position of the observer. This inaccuracy amounts to about 9 degrees at New York, about 15 degrees at London, and attains a value of upward of 30 degrees on a voyage between the two places; at some points in the region of the magnetic pole the error is very large, and, as may readily be conceived, in localities between the magnetic and geographical poles the «north» end of the needle points due south. The error caused by this discrepancy in the indication of the needle is called the «variation,» or «declination,» of the compass; its value has been determined, by observations, for all the navigable waters of the globe, and the results are accessible to the mariner, who makes allowance for the false pointing of his compass according to the position in which he finds himself; he must be careful, however, to employ the value corresponding not only to the proper place but also to the proper time; for the magnetic pole has a slow motion which is constantly creating differences in the values of the variation, so that in the course of a few years a material alteration takes place in this error in each locality.

This false pointing due to variation is only one of the untruths of the needle; there is another and a more obscure one that the navigator must guard against. In every vessel in which iron or steel is used to any material extent for construction or equipment, or in which these metals are carried in the cargo, there is exerted upon the compass needle a magnetic effect independent of that of the earth, and the needle, instead of seeking the magnetic pole, takes up a position that is dependent upon the combined influence of the magnetic force of the earth and that of the ship. This error is called the «deviation» of the compass, and it exerts a different influence and therefore produces a different deflection of the needle, on every different heading of the ship, in every different locality, and on every different angle of inclination from the vertical, or «heel,» of the ship; in other words, it is different at Yokohama from what it is at Singapore — different when the ship heads northeast from what it is when she heads southeast, different when she heels to starboard on one slope of a wave from what it is when she heels to port on the other slope. It is not at all unusual for the deviation to amount to as much as 45 degrees, and it may reach a very much higher value. To overcome this error due to the ship's own attraction of the needle, it is customary to «compensate» the compass,— that is, to place near the needle artificial deflectors which will oppose to each of the various magnetic forces of the ship an equal corrective force, and thus neutralize the disturbance under all the various circumstances that may arise. Such of the ship's metal as has actually attained the properties of a magnet is corrected by small bar magnets; to such as exerts a magnetic effect through «induction» only (that is, the temporary influence of the earth's magnetism), non-magnetic masses of iron are opposed which are capable of acquiring an equal amount of temporary magnetism under identical conditions with that of the ship; and so for each of the disturbing elements. By the compensation of a compass it is possible to reduce the deviation to a very small amount, and such residual as there may be is then determined and allowed for.

But even with the compass thoroughly understood there are other errors that may occur in the reckoning of the course; the helmsman may be inexpert or the sea heavy, and in consequence the ship may not always head as desired; she may go off sidewise, or, to use the nautical expression, «make leeway,» to an unknown degree; and an ocean current for which it is impossible to make accurate allowance may produce errors of both course and distance.

The distance run is the second essential element of the dead reckoning. It is ascertained by various methods. In the early days of navigation it used to be determined by tossing a piece of wood overboard from the forward part of the vessel and then having a man walk aft, keeping abreast of it as it was left behind by the vessel; the time it took the man to traverse a known distance on the deck afforded a basis for calculating the speed.

This method was replaced by one still in use on many vessels — «heaving the log.» A «chip,» or piece of wood of appropriate shape is tossed overboard astern, being arranged to float in an upright position and thus present a flat surface not easily drawn through the water; to it is attached a marked line; the chip remains stationary while the line is paid out from a reel; the distance that the chip is left astern in a given time (usually indicated by a sand-glass) shows the speed of the vessel, the marks of the line being so placed as to give the result directly in knots.

The most modern method of determining speed is by the "patent log"; a small screw-shaped "rotator" is kept towing astern at the end of a long plaited line; as the vessel moves through the water the little screw rotates, the principle involved being the same as that upon which the big screw-propeller drives the ship; each turn of the rotator is transmitted through the tow-line to the shaft of a registering apparatus, and the distance run at any moment may be read from the register as one tells time by the clock. Some navigators dispense with all instruments and reckon distance by the revolutions of the engine — a successful method if they have a sufficiently extensive acquaintance with their vessels to know the number of revolutions required to drive the vessel a distance of one knot through the water under all the different conditions that may be encountered.

Absolute accuracy of results in the recording of distance is seldom attainable, notwithstanding the superior means of determination that exist in these later days; so that the distance, like the kindred term of the problem, the course, can never be relied upon implicitly, and the navigator must look for a means to obtain, from time to time, a fresh "departure" by which he may start anew his dead reckoning. For this purpose observations of the celestial bodies are made.

For the taking and working of astronomical sights there are required a sextant, a chronometer and a nautical almanac. The sextant is a light, handy instrument by means of which the angle between two objects may be measured. It carries two mirrors, of which one is capable of motion about a pivot, and the other is fixed. There is a telescope through which the observer looks directly toward one of the objects — in the case of a sea observation, the horizon; the movable mirror is then placed in such a position that a ray of light from the second object (the sun, or other heavenly body) is reflected to the fixed mirror and thence, through the telescope, to the eye of the observer. When the one object, seen directly, and the other, seen by reflection, appear to the observer to be in coincidence, the measure is made, and it only remains to read the amount of the angle from a graduated scale over which an index travels to mark the position of the movable mirror on its pivot; and so nice is the graduation and so effective the method of reading that angles may be measured to the nearest ten seconds, or to $\frac{1}{360}$ part of a degree. This accurate instrument is the descendant of a primitive one, used by early navigators, in which the measure was made by a plumb-bob — a very rough guide, especially on board a vessel tossing with the sea.

An instrument of equal importance in navigation is the chronometer, which is nothing more nor less than a time-piece in which every known device is employed to insure absolute uniformity of running. It is hung in "gimbals," or swinging rings, so that it may remain level as the ship rolls and pitches; and it is kept in a damp-proof, dust-proof and shock-proof case, and treated with the utmost tenderness, being especially guarded from changes of temperature. It is not expected that the chronometer shall always show absolutely the correct time of the standard meridian, but the requirement demanded is that its gain or loss shall be precisely the same from day to day; the latter condition being fulfilled, the navigator may ascertain, before leaving port, the "error" of his instrument, or the amount it varies from the true time at a certain place on a certain day, and the "rate," or amount of change in each 24 hours; and with this information it is a simple matter to determine the error in the indication on any future day, providing the actual rate agrees with the predicted one. Good chronometers, properly cared for, run with wonderful uniformity, and few gain or lose as much as three seconds a day. The evenness of their going is such that navigators may count upon the longitude based upon their indications being correct within a couple of minutes, even after a long voyage; and when it is considered that four seconds of error in the chronometer makes an error of a minute in the longitude, the accuracy with which the performance must agree with the prediction may be realized. In view of the importance of the chronometer in the determination of position, the better equipped vessels carry three or more of these instruments, instead of putting unlimited faith in a single one; for in every piece of mechanism there is a chance, however remote, of misbehavior somewhere, and with several instruments available for comparison any departure from a normal rate on the part of one is quickly revealed by the others. It is probable that a further safeguard will soon be afforded, for when the wireless telegraph comes into general use a signal may be sent out each day at Greenwich noon or some other definite instant of time, thus enabling the error of the chronometer to be determined daily at sea with as complete accuracy as it may now be determined ashore.

The finding of the ship's position by astronomical methods is not possible without a knowledge of the time, this element having a direct bearing upon the longitude. Hence no great degree of accuracy in navigation was attainable until the invention of a time-keeper that could be counted upon for an even performance under the conditions existing on shipboard. In 1714, the Parliament of Queen Anne offered a reward for the production of such an instrument, the amount to vary with the degree of success achieved. John Harrison, an Englishman who had devoted his life to the perfection of the chronometer, finally offered an instrument which, in 1758, was placed for trial aboard a naval vessel making a voyage to Jamaica and return; on arrival home, after an absence of five months, the error of its indication was found to amount to only 1 minute 5 seconds, or about 16 minutes of longitude, and the inventor was awarded the highest prize that had been offered, $100,000.

There is published annually, by the government of each of the more important maritime nations, a "Nautical Almanac," in which are given tables by which the positions of the sun, moon, planets and all fixed stars of material magnitude may be found for any instant throughout the year. The navigator who is supplied with this book, together with a sextant by which he may measure the angular height, or «altitude,» of any visible body above his horizon, and a chronometer rated to the exact time of a standard meridian (such as that of Greenwich), has at hand all the means necessary for finding the vessel's position by means of the celestial bodies.

Suppose that a bird is flying through the air on a known course and in such manner that its position above the earth may be determined for any given instant of time; and suppose that at a certain moment an observer with a sextant and watch measures the altitude of the bird — that is, its angular height above the horizon — and simultaneously records the time. Now take as a centre the point on the earth vertically below the bird, this point being known from the position as given by the time; and from that centre draw a series of circles. If we consider any one of those circles it may be seen that from every point of its circumference the bird will appear at the same angular distance above the horizon at the given instant; further, there will be one circle whose circumference contains our observer, and from every point of that circumference the altitude of the bird will be that which he measured. It is therefore clear that the observation has resulted in locating the observer upon one of a series of points which lie upon a certain circumference; but it has not defined the particular point. If, however, there is another bird flying in a known track, or if the observer waits while the first bird changes position somewhat, he may observe a second altitude and draw another circle that also takes in his position; then he will know that he is at one of the two points where those circles intersect, for if he is at the same time on both circles these are the only places at which the condition is fulfilled.

At sea, the sun, moon and stars take the places of the birds with which we have just been dealing, and our spheroidal-shaped globe that of the plane surface upon which we considered the observer to be standing. The altitude of a celestial body is measured with the sextant and the time is simultaneously noted by the chronometer; the chronometer correction being applied, the navigator knows the exact instant at which the observation was taken, which, from the information given in the Nautical Almanac, defines the position of the observed body with relation to the earth, taking account both of the daily rotation of the earth about its axis and of its annual revolution about the sun; and, having located the body, a circumference may be determined which will, like that in the case of the bird, take in all positions at which the observed altitude is possible; so also may a second circumference be determined either by a second celestial body or by the same body at a later time, and the intersection of the two circles will give the position of the ship, due allowance being of course made in case there has been a change of position between the two sights.

Practically, it is never necessary to deduce the whole circle, for the circumference may be very large, taking in perhaps half the globe; the navigator need only work out an arc a few miles in length, for the vessel's position is always known within narrow limits from the dead reckoning; for a similar reason, there is never any question in the navigator's mind as to which of the two intersections represents the true position. The computation is not a difficult one, being facilitated, like many other operations in navigation, by tables. When the body observed is on the meridian the problem assumes a particularly simple form, and hence it is an invariable rule, if the weather is clear, to take an observation of the sun when it attains its maximum altitude at noon, and to work up the day's run to that time and begin anew the dead reckoning. Any heavenly body may be used for obtaining position, providing it shows with sufficient clearness to be observed through the sextant, and providing also that the horizon is in sight. Sights of the sun are more generally used than those of other heavenly bodies; indeed, there are some navigators that seldom employ others; such sights have some advantage in simplicity of working, and may usually be taken with a more distinct horizon and consequently greater accuracy; but in the fast-moving modern steamers it is almost imperative to find the position more frequently than is possible by using the sun alone, and so the stars and planets (and occasionally the moon) are called into service.

When clouds and fog prevent the taking of observations, the mariner has no recourse but to rely upon the dead reckoning; but his reliance, in such a case, is not implicit, and the cautious captain — and how few are not cautious, with their heavy responsibility for life and property? — makes due allowance, in approaching the land, for possible inaccuracies in the supposed position.

Thus far, the methods of the navigator in the open ocean have alone been considered; but there is another branch of his art that remains to be touched upon — «piloting,» where the land is in sight, and where courses are shaped and positions found from terrestrial objects. The first requisite for this work is a nautical chart, which shows the features of the land and water with a completeness of detail that the landsman would scarcely dream of. Upon it are represented, in proper position, the shore-line and the prominent characteristics of the land,— mountains, towns, lighthouses, windmills, conspicuous trees and houses, sand beaches, bluffs, rocks, islets — everything that could possibly be recognized by a person on a passing vessel and utilized for locating position. The water is also depicted, and nearly all that is above and below it — buoys, light-ships, and all floating objects of a permanent nature; the depth of water at frequent intervals, especially over shoals, reefs, and dangers; the character of the bottom in different regions, whether mud, sand, coral, or other substance; the direction and velocity of tidal and other currents that may be expected; and much useful information besides. By this chart, the ship may be guided in safety among the dangers that beset her near the land. When any object is in view which is portrayed upon the chart, the navigator may observe, by sighting over the compass, the «bearing,» or direction, in which it lies; if a line is drawn upon the chart through this object in the observed direction by the aid of the compass circles placed here and there, it is known that the ship's position on the chart is somewhere upon that line; then, if a second line is similarly drawn through another visible object, the exact location of the ship must be at the intersection of the two. Various other methods of a like nature afford the means for plotting the position of the vessel.

If, as in foggy weather or on an unlighted coast, there is nothing in sight by which the ship may be located, soundings may be taken, and the depth of water and character of bottom compared with those shown on the chart, thus giving a fair approximation to the position. In certain places, the nature of the bottom is more favorable for navigation by soundings than in others; thus the formation of the ocean bed to seaward of New York is such that in thick weather vessels may, with care, run well in toward the entrance of the harbor with no guide but the depth. Soundings may be made by direct measurement with a marked line lowered to the bottom by a heavy “lead” which serves as a sinker, but the method involves stopping the vessel to get an “up and down cast” when the depth is considerable; this disadvantage is obviated by the employment of a patent sounding-machine, the most useful of all modern inventions for the aid of the navigator, in which the depth is determined from the pressure exerted by the weight of water above the lead; this device registers as accurately when trailing astern as when suspended vertically, so that soundings may be taken with the vessel going at regular speed.

In piloting, the navigator receives assistance from all sorts of artificial marks that are maintained for the purpose by the various governments, and the ingenuity displayed in some of these is characteristic of the age in which we live. There are all sorts of buoys — spar buoys and can buoys; buoys that ring bells as they roll with the sea, and those that blow whistles by the air compressed as they rise and fall upon the waves; buoys that are lighted by electricity and those that are lighted by gas, the latter burning night and day, without renewal, for months, and sometimes automatically eclipsing their lights at definite intervals to make them distinctive. Then there are all sorts of lighthouses showing all sorts of lights — fixed, revolving, flashing, intermittent, white, red, green; and some possess one characteristic in directions whence the approach is clear, and another characteristic on bearings where they shine over dangers. There are also the lightships to give warning of dangers at a distance from the shore, like that on the Diamond Shoals, 14 miles from the dreaded Hatteras, maintained in one of the most boisterous spots of the ocean, which, besides showing other lights, throws a search-light beam vertically toward the heavens to mark the mariner's way. Moreover, since lights are of small avail in foggy weather, nearly every lighthouse and lightship has its fog signal — a siren, a steam trumpet, a bell, or sometimes a gun; and each of these is sounded according to some precise characteristic by which it may be recognized and distinguished.

George Wood Logan,
Lieutenant, United States Navy.

Navigation Act, an important act passed by the British parliament in 1651 for the protection of British shipping and commerce. In relation to early American conditions the act provided that all colonial trade should be carried on in ships built and owned in England in the colonies (a provision which stimulated colonial shipbuilding), and that, in the case of many specified goods, trade should be with England only. The act was largely rendered inoperative by colonial smuggling. The efforts at last made to enforce the rule were among the chief causes of the Revolution.

Navigation Laws, as adopted by the United States in 1792–3, have been in operation since that date with few changes or revisions. The laws contain the following provisions: No vessel, unless entirely built in this country and wholly owned and officered by Americans, is considered an American vessel having the right to be protected by the American flag. No foreign vessel is permitted to engage in the American coasting trade, the same extending from Atlantic to Pacific ports. American vessels are no longer considered as such if even a part-owner (with a few exceptions) resides abroad for a short time. Transfer of an American vessel to foreigners prohibits it from ever again sailing under the American flag. If an American vessel makes any repairs in a foreign port, duty must be paid on the value of all such repairs on her return to this country. The repairing of foreign vessels in our ports, with foreign materials, is placed under restriction. A tax of six cents per ton of their burden, called a tonnage tax, is imposed on all vessels (except fishing and pleasure vessels) engaged in trade to ports not in North or Central America and a few other specified places, the maximum aggregate tax in any one year not exceeding 30 cents. Foreign vessels pay the same tax, but if one of the officers of an American vessel is a foreigner, it is forced to pay an additional tax of 50 cents. Materials for the construction of vessels for foreign trade may be imported free of duty, but the duty must be paid if the vessel engages for more than two months a year in the coasting trade. American vessels may unload at any port of delivery in the customs district, but foreign vessels can only discharge their cargoes at a port of entry, which is a certain designated port in each customs district in the United States. Exceptions are made when they are laden with coal, salt, or similar merchandise in bulk. See Admiralty Laws; Law, Maritime.

Nav'igators' Island. See Samoan Islands.

Naville, Edouard Henri, ĕd-oo-ăr ŏṅ-rē nä-vēl, Swiss Egyptologist: b. Geneva 14 June 1844. He was educated at the University of Geneva, at King's College, London, at Bonn, and at Paris; went to Egypt in 1869, and there made important discoveries; was appointed editor of the ‘Book of the Dead’ by the London Congress of Orientalists in 1875, and in 1886 published ‘Das Aegyptische Todtenbuch der 18. bis 20. Dynastie’; and in 1801 became professor of Egyptology at Geneva. He contributed volumes on the store city of Pithom (1885), on Goshen (1887), on Osorkou II.'s festival hall (1892), etc., to the ‘Memoirs’ of the Egypt Exploration Fund.

Navy, History of the. From a period earlier than authentic history, the Greeks began to exhibit a spirit of naval enterprise, and as long as their independence remained the various states into which both the mainland and the islands of Greece, as well as their Asiatic colonies were divided, rivaled each other in planting colonies and pushing their commerce in all directions. These states had also their armaments, and fought fiercely with one another, as well as with their foreign foes. The Athenians, Corinthians, Rhodians, even single cities like Chalcis and Megara, became renowned for their naval strength, and naval battles play a conspicuous part in the history of Greece. In the Persian invasions of Greece the size and power of the Persian fleets also forms a notable circumstance, and the great battle of Salamis (480 B.C.), in which Themistocles defeated the fleet of Xerxes, was the turning-point of the last Persian invasion. The smallness of the Greek galleys, and the superior size and number of those of the enemy, render this battle remarkable. The details of the tactics employed in it, and even the position of the rival fleets, are still matters of critical disputation.

But centuries before the rise of any naval power in Greece, Phœnicia (q.v.) had, certainly as early as 1100 B.C., a powerful fleet to protect its commerce and colonies through the Mediterranean from the attacks of pirates.

Among the Phœnician colonies arose one which in enterprise, ambition, and power eclipsed the parent state. Carthage, the rival of Rome, rose to her high rank among the nations of antiquity purely in virtue of her naval commerce. In her long struggle with Rome it was mainly the wealth acquired by commerce which enabled her to maintain the conflict. The Carthaginians also stimulated the Romans to enter upon naval enterprise. A Carthaginian vessel which had been cast on the coast of Italy furnished the model for their first fleet, which consisted of 100 quinqueremes and 20 triremes. This fleet is said to have been built in 60 days. Duilius, who commanded it, wisely distrusting the seamanship of his improvised sailors, contrived a means of approximating his first contest with the Carthaginians as nearly as possible to a land fight. By the use of grappling irons peculiarly contrived the Roman vessels were firmly attached to those of the enemy, and a struggle ensued, in which superior force and determination alone could influence the result. Thus the first great naval battle of Rome, fought off the Lipari Islands, 260 B.C., by the fleet of Duilius against a Carthaginian fleet of superior size under a leader named Hannibal, resulted in a complete victory, which was celebrated by a triumph at Rome.

The Ancient Galley, the war-ship of the Greeks, was a narrow vessel about 100 feet in length. It was admirably fitted to move rapidly in smooth water, and the numerous rowers gave great impetus to the attack of the beak, which was its principal means of aggression. The bow curved inward, forming a circular beak, which was faced with iron; or else it receded suddenly, having a single sharp point like a ploughshare, projecting at the surface of the water, and intended to open the side of an antagonist. Frequently the beak was formed to represent a lion, tiger, or other ravenous beast calculated to inspire terror. It was always surmounted by the national emblem; thus an owl stood on the prow of an Athenian galley; a cock on a Phœnician or Carthaginian; and the eagle on a Roman. Here or at the stern were also placed the ensigns and standards, and trumpeters standing beside them sounding their shrill blasts to inspire courage at the moment of onset. From the bow to the stern there extended a flooring or deck, which served as a battle-field for the mailed and heavy-armed soldiers. The stern was covered with a circular shed or pavilion, richly carved and decorated with streamers and trophies. Under this was placed the *tutela,* representing some patron deity, to which sacrifices and prayers were offered, and which was held so sacred as to furnish a sanctuary to whoever took refuge there. From this elevated station, too, the commander surveyed the fight and directed the efforts of his followers. There were two distinct classes of officers and men in each galley. The commander of the soldiers was supreme, and under him the pilot, who took his station abaft, at the side of the steersman, directed all necessary evolutions and maneuvers. The pilot was assisted in the command of the sailors by his mate, and by the boatswain or encourager of the rowers; whilst a musician marked the measure of the stroke, and by the harmony of his voice and instrument inspirited the rowers when weary with toil. The rowers were frequently, as in modern times, malefactors chained to the oar. Javelins and arrows were discharged in showers from the deck, or from turrets at the bow and stern. As a protection from these a curtain of hides was used, from behind which the soldiers discharged their missiles in return, and thrust with long spears used only at sea. In the centre were engines from which rocks were projected of size sufficient to sink a ship; and masses of iron called dolphins were projected from the mast-heads to break the bottom of the enemy's vessel. But the chief means of offense was the attack of the beak, and to make it with advantage it was generally desired to gain the wind. Combustibles were also cast from ship to ship, and peculiar devices due to the ingenuity of the particular commanders adopted on special occasions. The line of battle was usually triangular, the admiral's ship being at the angle in advance, and the line of storeships forming the base. Before encountering it was usual for the admiral to pass in a small boat throughout his fleet, haranguing his followers, and urging them to do their duty. Thus inspirited a shout of anticipated triumph would pass from ship to ship, and when the gilded shield was at length displayed as a signal for battle, the shrill trumpets sent forth their blasts, and the combatants rushed to the encounter, rending the air with shouts and war songs. The battle won, the victors returned to port, towing their prizes, their ships being decorated with fragments of the wrecks, themselves crowned with laurel, and singing pæans to Apollo. The richest of the spoils was reserved as an oblation to the gods, and broken or sometimes entire galleys were placed in the precincts of the temples. Little change was made by the Romans in their mode of warfare down to the time of the fall of the empire. The emperors of Constantinpole had still a fleet of galleys propelled by rowers.

Navies of the Middle Ages.— On the fall of the Roman empire naval enterprise declined, but only for a brief period. The honor of reviving it is disputed by the French and the Italians. To the latter chiefly belongs the honor of leading the way in the development of modern European commerce, but for the growth of naval armaments we must look also to the north of Europe. Charlemagne had a considerable fleet both on the Mediterranean and the ocean; but already in his time, and even in that of his predecessors, the settled states of Europe had begun to become subject to the piratical excursions of Northmen and Danes, which were afterward directed so persistently against England, and continued for several centuries to disturb its government. In the meantime the Italian republics of Venice and Genoa began to restore the commerce of the Mediterranean, and to open up communications with India by the Red Sea and the Persian Gulf. The Pisans and Florentines followed, and in the time of the crusades the chief naval armaments of the Christians were supplied by the Italian cities. The successors of Charlemagne did not follow his example in maintaining a regular fleet, yet Saint Louis was able to transport his own army to Africa, and to defend his coast against the English, but Philip le Bel had recourse to the Genoese against the English. The great naval battles of these times were fought among the Italian republics, or by them against the Turks, with whom they alternately traded and made war. After the epoch of the crusades we have a period which in one aspect of its development might be called the epoch of commerce and especially of mercantile navigation. The honor of leading the way in this new epoch belongs to the Portuguese. They were followed by the Spanish, the English, the Dutch, the French, and ultimately by all the other nations of Europe, according to their means and opportunities. The Spanish navy reached its highest power in the time of Charles V. and Philip II. Francis I. attempted the revival of the French marine and it was vigorously undertaken by Richelieu. The administration of Colbert revived both the mercantile and national navy, and the latter attained its chief strength and highest glory in the reign of Louis XIV., when it opposed, and sometimes not unsuccessfully, the united navies of England and Holland. The navy of Holland became powerful almost from the time of the national independence, and contended with success alternately against the fleets of England and France. Some of the most hotly contested naval battles on record have been fought between the English and Dutch fleets.

Cannon are said to have been first used in naval warfare by the Venetians against the Genoese in 1370, a considerable time after their invention.

The Battle of Lepanto.—The famous battle of Lepanto, which was fought between the Christian powers and the Turks 7 Oct. 1571, may be considered as representative of the first stage of the transition from the earlier mode of warfare. The Christian fleet was collected in the port of Messina in September 1571. It was contributed by the powers who had joined in the Holy League. The Spanish fleet consisted of 77 Spanish, 6 Maltese, and 3 Savoyard galleys under Don John of Austria, who commanded the joint fleet; there were 12 papal galleys, under Marc Antonio Colonna; and 108 Venetian galleys, and 6 galeazzi under Sebastian Veniero. The Turkish fleet, consisting of 300 vessels, under Capudan-pasha, Musinsade Ali, lay in the Gulf of Lepanto. Though the Turks were more numerous, the Christians were better armed and equipped. Their soldiers wore coats of mail and helmets, and were provided with firearms. The Turks defended themselves with leathern shields, and had bows and arrows in place of guns. The prows of the Christian galleys were less open and better defended than those of the Turks. The admirals, according to ancient custom, led the van. Both parties moved to the assault, but the wind changing at the moment favored the Christians. The admirals' galleys closed after a brief cannonade, and grappled each other. The Spaniards boarded three times, and were thrice driven back. A reinforcement of 200 men enabled them to return again to the assault with decisive effect, and an indiscriminate slaughter of the Turks took place. The head of Ali was exhibited on a pole to his followers. The battle after this only waxed fiercer, and the Turks fought with the courage of despair. So intense did the struggle become that the galley slaves in both fleets joined in the contest; but while the galley slaves of the Christians, who consisted of criminals, fought on their own side in hope of earning a pardon, those of the Turks, who were Christian slaves, rose against their masters. Over 15,000 Christians are said to have been relieved from servitude by the victory. The Turks lost besides 224 ships and 30,000 men.

Modern Navies.—The improvements determined by the use of artillery were chiefly an increase in the size and offensive strength of the ships, and a relative diminution in the number of men. Oars were abandoned for sails. Battles were fought and ships maneuvered by the sailors, and the marines or organized body of soldiers became a mere auxiliary force, available as sharpshooters and for land engagements. Two leading qualities now stood forth as the most important object to be attained in the construction and equipment of vessels for war — strength of offensive armament and speed and facility of maneuvering. These qualities did not now first acquire importance, but they gained in relative importance at the expense of a previously preponderating element of equipment, namely, the number of fighting men available for assault at close quarters. Two classes of vessels, according to the preponderance of one or other of these qualities, thus came to constitute the chief strength of modern fleets. The ship of the line, or first-class war-vessel, carried the strength of offensive equipment to the utmost limit practicable without sacrificing seagoing qualities. The frigate, only excelled in strength by a line-of-battle ship, was built and rigged with every artistic appliance to secure speed. Even line-of-battle ships were sometimes made too heavy for effective service, and facility of movement could not be altogether neglected with impunity; but the great point in a first-class vessel was the weight of broadside, and a hundred or more guns on three decks were commonly carried. In a pitched battle it was the line-of-battle ships that bore the brunt of the fight and decided the day. The frigates scoured the seas on special missions, escaped from the enemy's line-of-battle ships by speed, destroyed his privateers, and protected the commerce of their own state. During all the great European wars these were the leading types of vessels employed. The tactics of naval warfare during this period, allowance being made for the different means of offense, did not differ materially from the ancient methods. To gain the wind of an adversary, to break his line and to engage him at close quarters with superior force, were still the main objects to be pursued. But a change took place when steam was introduced as a means of propulsion, and iron as a material for the construction of vessels. Vessels clad in iron armor now came to supersede the oak-built ship of the former epoch. More recently improvements made in the size, range, and destructive power of projectiles have effected a new revolution, or succession of revolutions, in the science of naval armaments, and the broadside has given way to a small number of powerful guns. The struggle between these new developments of offensive and defensive force still goes on. Iron clad and steel clad ships have superseded the wooden walls, and the introduction of gunboats, torpedo boats, submarines, torpedo destroyers and other craft have made naval warfare a new and peculiar science, totally different from the naval warfare of the past.

See NAVAL ARCHITECTURE; NAVAL SERVICE, THE; NAVIES OF THE WORLD; NAVY OF THE UNITED STATES, THE.

Consult: Clowes, 'Royal Navy'; Garbett, 'Naval Gunnery'; James, 'Naval History of Great Britain'; Longridge, 'Naval Guns'; Mets, 'Naval Heroes of Holland'; Rawson, 'Famous Naval Battles.'

Navy League of the United States, The, an organization formed in 1902 for the purpose of upbuilding the American navy. In 1903 the association began the publication of a monthly bulletin, 'The Navy League Journal.' The League has a large and growing membership and promises to exceed that of similar organizations in Europe. The German Navy League has now, at the end of its fifth year, 626,201 members. The British Navy League, with sections in all the British provinces, has nearly as many members, and is becoming a great power in Great Britain. The French Navy League, with a former president of the republic as its president, has the support of the most influential people of France.

Navy Maneuvers. See ARMY AND NAVY MANEUVERS.

Navy Register, a Government publication issued annually by the United States Navy Department. It gives a complete list of the officers of the navy and the marine corps in order of their rank, lists of retired officers, resignations, dismissals, deaths, ships in service and other important naval information.

Navy Yard, a water-frontage usually including wharves and dry docks used by the government for building and repairing warships, keeping naval stores, etc. In Great Britain the term dockyard is generally used. On the continent the word arsenal is frequently employed. In England the royal dockyards are at Chatham, Sheerness, Portsmouth, Devonport, and Pembroke, besides the Deptford and the Woolwich store yards. There are also royal dockyards at Haulbowline in Cork Harbor, at the Cape of Good Hope, Gibraltar, Malta, Halifax, Bermuda, Antiqua, Jamaica, Sierra Leone, Trincomalee, Singapore, Hong Kong, Esquimalt (Vancouver's Island), Fernando Po, Sidney, and Shanghai. The greatest naval centres of France are Cherbourg, Brest, Lorient, Rochefort, Toulon, and Bizerta in Tunis. Germany has three ports of war, Kiel, Dantzic, and Wilhelmshafen. Trieste and Pola are the Austrian naval harbors. Russia has Cronstadt and Sebastopol at home, and Vladivostok in the Amur territory. In the United States the principal navy yards are located as follows: New York (Brooklyn, N. Y.); Mare Island, Cal.; Norfolk (Portsmouth, Va.); Portsmouth, N. H. (Kittery, Me.); Boston (Charlestown, Mass.); League Island (Philadelphia); Washington, D. C.; and Pensacola, Fla. Besides the navy yards there are several naval stations, the important ones being at Boston, Mass.; Newport, R. I.; Indian Head, Md.; Norfolk, Va.; Bremerton, Wash.; Port Royal, S. C.; Portsmouth, N. H.; Philadelphia, Pa.; Cavite, Philippines; San Juan, Porto Rico; Tutuila, Samoa; Guam, Ladrones; Havana, Cuba; Honolulu, Hawaii; Sitka, Alaska; and Yokohama, Japan. In the early history of the United States navy, nearly all the vessels were built and equipped at the navy yards. The six wooden frigates used in the Civil War were there constructed, but the modern steel warships have been built chiefly by contract, by private builders, so that the navy yards now are used mainly for repairs.

Navy of the United States, The. The American navy came into existence in 1775 after the close investment of Boston by Washington had cut off all supplies to the British troops, save such as might arrive by water. To intercept these, some small vessels were armed and manned by New England seamen, first under the auspices of Rhode Island and Connecticut, and afterward by authority of the Congress which organized a Naval Committee with John Adams at its head. These little craft not only deprived the enemy of succor, but captured enough prizes to furnish the colonial army with war material, without which it could not have continued hostilities.

Early History.—In 1776, the navy had 31 cruisers mounting 586 guns, and no less than 136 privateers mounting 1,360 guns had also been fitted out. Including the flotilla on Lake Champlain, the government war vessels in service during the Revolution numbered in all 64, carrying a total of 1,242 guns. This force captured 196 vessels worth about $6,000,000, and the privateer auxiliaries, numbering 792, mounting over 13,000 guns, took 600 British ships, valued at $18,000,000. Insurance on British bottoms rose from two to fifteen per cent. This unprecedented destruction of British commerce, and the fact that the Colonies were literally supporting their forces from captured British goods, were among the strongest arguments which led to peace.

The Hancock, Randolph, Raleigh and other cruisers authorized by Congress were excellent ships, and the Alliance and Confederacy built toward the close of the war had no superiors afloat. They were mainly armed with 4- to 18-pounder guns. Progress, however, stopped when independence was achieved, and the vessels were sold and men discharged. In 1794, a law re-establishing the navy under the secretary of war was enacted and six frigates authorized. Of these, three were constructed, the Constitution, 44 guns, 1,576 tons; Constellation, 36 guns, 1,265 tons; and United States, 44 guns, 1,576 tons. The Constitution is still afloat. Three were abandoned and the material sold. Under the pressure of French spoliations, however, the navy was increased and at the beginning of the quasi-war with France in 1798 it aggregated 22 ships with 456 guns and 3,484 men. This little force during the two and a half years of hostilities captured 84 French armed vessels mounting over 500 guns. The military discipline of the navy here begins: the American officers, largely recruited from merchantmen, learned from the commanders of the British war vessels in the West Indies, the traditions and customs of the older service. Then also came in the carronade or short gun, with little penetrating but great smashing power. At the end of the French war, another reduction of the navy took place. The theory that ships and guns could be called into existence when needed, as easily as log cabins, even at that early day, had become well rooted. Accordingly after cutting our force down to 15 vessels, we deemed it wise to present the Dey of Algiers with 26 barrels of silver dollars and the fine frigate Crescent to induce him to let our commerce alone. Tripoli in her turn, being thus encouraged, demanded special blackmail. Thereupon the navy once more rejuvenated, not merely destroyed the Barbary pirates, but emerged from the war in 1805, a sea power hereafter to be taken into account in the world's diplomacy. It was during these campaigns that disciplinary routine was so highly perfected by Commodore Edward Preble that it has remained with little substantial alteration to the present day. It was then also for the first time that the American navy was accorded all the formal honors of a national service by the war-ships of other countries.

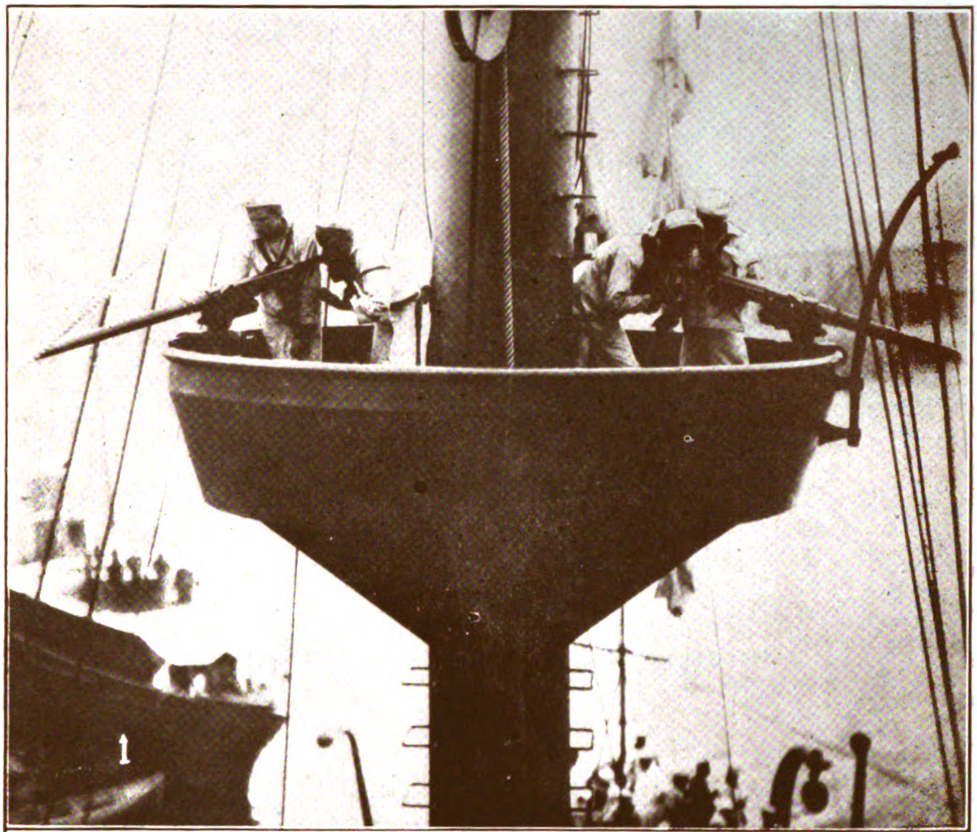
War of 1812.— When the War of 1812 with Great Britain began, the navy had 17 ships aggregating 15,300 tons and carrying 442 guns and 5,025 men. It had no yards, no docks, no adequate means of any sort for repair or refitting. The British navy, fresh from the victories of Trafalgar and the Nile, had over seven times this force on the North American station alone. Within seven months the United States ships had reduced three British frigates to wrecks and taken 500 merchantmen — a result which astounded the world. The Constitution 55 guns destroyed the Guerrière in 40 minutes and the Java in one hour and 55 minutes, and the United States 54 guns dismantled the Macedonian 29, in about an hour and a half. The subsequent sloop actions were almost equally decisive. The noteworthy fact of these duels was the destructive character of the American fire — which literally tore the British ships to pieces and converted their decks into slaughter-houses. Three prominent factors contributed to success.

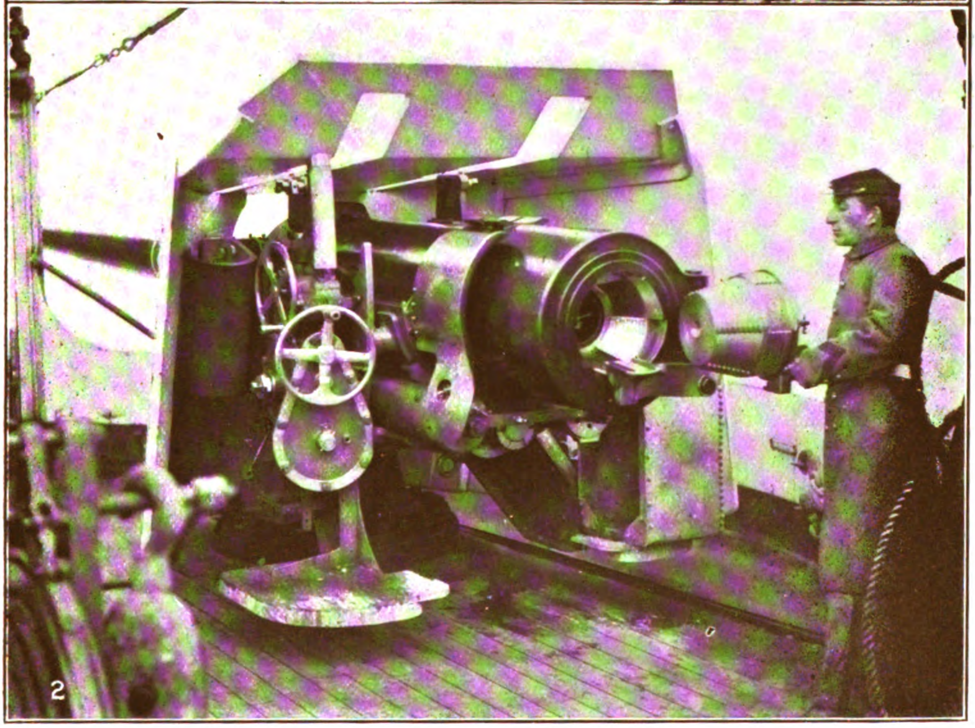
1. The United States ships, and especially the frigates were larger — 12 feet longer — and at the same time more easily maneuvered than any which had ever before been built. The sloops-of-war outclassed those of foreign navies at every point.

2. The frigates concentrated the power of a ship of the line. They mounted long 24-pounders in broadside — an innovation startling for the times. To the Guerrière's 32 long 18's and 16 short 32's the Constitution opposed 30 long 24's and 24 short 32's. When she fought the Java she had increased the number of her long 24's to 32, so that while decreasing the number of her short guns to 22, she had augmented their size to 24-pounders. That gave the combination of low power, heavy smashing projectiles with relatively high power penetrating projectiles which characterized the navy armament for many a year afterward.

3. The American gunners aimed their guns. They had been taught, as their fathers from the backwoods who had harried the Hessians had been taught, to fire at targets; to use their long cannon as they used their long fowling pieces and to send round shot into hulls at the water line, just as they were accustomed with their rifle bullets to bring down ducks on the wing. The British system then involved no gun pointing. The carronades had no sights and were laid level — point blank — with a range of about 500 yards. They were fired with the same hope of hitting something which King George's grenadiers or those of his serene Highness of Waldeck cherished when they presented fire-lock and pulled the trigger in one motion. So long as shot cut up sails and rigging and so impaired motive power the desired end was attained. The bull-dog Briton could then lay his ship close aboard the enemy and finish the fight with boarders and cutlasses. But the handy American ships kept out of point blank range. Their long 24's enabled them to do this and at the same time deliberately to drill holes in the British water line, while occasionally anticipating the yet distant shell fire by sending slow heavy balls against the wooden sides and annihilating whole gun's crews with the resulting shower of splinters. That is how the Wasp cut up the Frolic in 43 minutes and the Hornet demolished the Peacock in just 11 — while incidentally demonstrating the superior advantages of firing on the down roll of the ship in order to convert the adversary into a sieve, instead of on the up roll which merely clipped his wings.

In the war of 1812, the regular navy numbering but 23 vessels carrying in all but 556 guns, captured 254 of the enemy's craft. The value of the prizes taken by the navy and the privateers jointly was over $45,000,000. The cost of British marine insurance became almost prohibitive, 13 guineas per £100 was paid to insure vessels crossing the Irish Channel. So great was the injury to British commerce that in June, 1813, flour in Great Britain was $58 per barrel and lumber $72 per 1,000 feet. Before the war was over, the English were building ships on the "exact lines" of the American 44-gun frigates, and cutting down some of their most famous line-of-battle ships to compete with them. After peace had been secured, the permanent establishment of the navy was fixed at 12 ships of the line, 14 first class frigates, 3 second class frigates, 6 sloops-of-war and a proportionate number of smaller vessels. The more famous craft built between 1814 and 1825 were the 74-gun ships Washington, Franklin, Columbus, Ohio and Delaware, which were armed with 12 eight-inch and 70 32-pounder guns. For a time, the





1. In the fighting-top of a United States warship.
2. Opening the breech of a powerful gun on a United States warship.

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North Carolina with 102 guns in three tiers of port-holes on her towering sides was regarded as the most powerful war-ship afloat. Meanwhile the possibilities of steam war vessels were looming up. Robert Fulton had built the Demologos in 1813, which not only was propelled by a midships paddle wheel — but had a queer collection of innovations, notably a battery of long 32-pounders supplemented by a 100-pounder submarine gun, and apparatus for discharging steam into an enemy's hull. She was accidentally blown up in 1829 and was succeeded by the wooden steam battery Fulton the Second, built in 1837 which, however, proved a failure. Four years later, the Mississippi and Missouri, side wheel steamers, were constructed and they were followed in 1847 by the Susquehanna and Powhatan — all excellent and serviceable vessels. The value of having the motive power beneath the water line had, however, already attracted attention to the screw propeller. In 1844, the Princeton, designed by Captain John Ericsson, the first screw steam war vessel ever built, was launched. She carried two long 225-pounder built-up guns, capable of piercing 4½ inches of wrought iron, and the first of their type. She was broken up in 1849 — but was in service long enough fully to demonstrate the naval importance of screw propulsion. The engineer corps of the navy (amalgamated with the line in 1899) was organized by act of 31 Aug. 1842, and in 1845 the United States Naval Academy (q.v.) was established at Annapolis.

The Civil War.—The screw steam war vessel was now fully developed and those of our navy were as graceful as yachts and the most formidable of their class. Between 1856 and 1859, we built the Niagara, Colorado, Merrimac, Wabash, Minnesota and Roanoke frigates and the Brooklyn, Lancaster, Hartford, Richmond, Pensacola, Pawnee, Michigan, Narragansett, Dacotah, Iroquois, Wyoming and Seminole sloops, some of which still survive. Meanwhile the Dahlgren shell gun began to replace the older type of smooth bore. When the Civil War broke out the navy, however, had become much reduced. Of the 90 vessels on the list, 42 were in commission and the rest unserviceable. The sailing ships still carried the ancient 32-pounders and 8-inch shell guns and only the steamers were provided with Dahlgrens — but these were regarded as monsters, their caliber having increased to 11 inches. It went to 15 and even 20 inches before the war closed — but the guns were very short, powder charges small and initial velocities seldom rose above 1,200 feet per second. These pounding weapons — true to the old principle — were supplemented by rifles mainly of the Parrott type, which lingered long after they had been proved about as dangerous to friend as to foe. When the war opened, the navy had 1,457 officers and 7,600 seamen — when it closed the officers numbered 7,500 and the seamen 51,500 — 208 additional vessels were built and 418 purchased. The total number of Confederate or British vessels captured or destroyed was 1,504, valued at $31,000,000, and the net proceeds of property seized on the blockade which was efficiently maintained over more than 3,000 miles of coast was $20,501,927. The cost of the navy throughout the Civil War was about $314,000,000, equal to only 9.3 per cent of the government expenditure for the whole period of four years and four months. The total number of ships of all classes in the navy in December 1864 was 671.

The great naval development of the Civil War was the Monitor, a raft-like vessel 172 feet long over all, of 41½ feet beam and 11⅓ feet depth, of hold plated with five layers of 1 inch iron on her hull and 8 layers on her single steam rotated turret wherein were installed two 11-inch Dahlgren guns. She revolutionized marine warfare and made the wooden steam frigate about as archaic as the Roman trireme. To a limited extent also (especially in the Confederate iron clads Virginia and Tennessee and the Federal so called «tin-clads» of the Mississippi) the armored casemate was subjected to test — but it is only of comparatively late years and following the great improvements in armor that the casemate has assumed a really important place in naval construction.

Reorganization.— After the Civil War, the navy as usual was rapidly reduced — the total number of vessels in commission in the fall of 1866 being but 115. The monitors were laid up at League Island and gradually destroyed. Five which still survive, though practically useless, were permitted a brief harbor service during the Spanish War. Two, however, of the more formidable class, the Miantonomah and the Monadnock, made long voyages respectively to Europe and around Cape Horn — thus for the first time demonstrating the sea-going capacity of low freeboard turret ships and dooming to final extinction the wooden man-of-war. Gradually but steadily the depletion of the navy list continued and vessel after vessel was sold. Many were broken up under the law decreeing destruction if needed repairs should be found to cost more than 20 per cent of the value — and finally in 1881, so far as ships went, the country was little better than defenseless. In July of that year we had as the steam navy, 13 so called first rates (all of wood of from 2,840 to 3,173 tons measurement) of which one, the Tennessee, was at sea and four were ancient craft still on the stocks and never launched; 20 second rates (929 to 2,300 tons, all wooden but one) and most of these old-fashioned and unserviceable; 27 third rates (410 to 918 tons), again all wooden but four, and some of the Civil War monitors. The rest of the navy was made up of wooden sailing ships, two of which had served in the War of 1812, including some that became all but worn out decades earlier while chasing pirates in the West Indies and slavers on the African coast. The one sea-going flagship Tennessee (plus «repairs») in ten years of active service gradually cost $3,800,000 and was ultimately sold for $34,555. Numerous other vessels built in the interval since the Civil War had meanwhile gone almost immediately from shipyard to scrap heap. «It is often the subject of wonder,» says the secretary of the navy in his report for 1887, «what has become of the $70,000,000 spent upon war vessels since the close of the war in view of the fact that there is now no navy.» The existing armament was as antiquated as the ships themselves. It consisted principally of 9-inch smooth bore and 8-inch rifle guns, all muzzle loading, and the latter had been economically concocted from old 11-inch Dahlgrens by inserting a wrought iron rifled tube in the bore. The only breech loaders in the service were those which had been “converted” from the miserable 100 and 60-pounder Parrott rifles. This deterioration of the navy, however, extended no further than to the ships, and, at times, to the Navy Department. Throughout all that long period of corruption and decay the discipline of the service never wavered, the attainments of the naval officers constantly advanced, drills and target practice were as scrupulously maintained on wretched wooden craft which the poorest foreign iron clad could send to the bottom with ease, as if they had been held on the most powerful of battleships, and although we had, at most, only 55 antiquated ships, every one of them too slow to run away from and too weak to fight with a war vessel of the modern build and equipment, none the less all were ready to do their best — inadequate as it was — instantly and at all times. The ships of the United States Navy have often become weak in numbers and bad in construction, but the men who handle them have never retrograded. In quality the personnel of the United States Navy has always been the best.

It was in 1881 that Secretary Hunt appointed an advisory board to determine the requirements of a new navy. It recommended 21 armored vessels besides 70 unarmored, together with rams, and most significant of all declared that the material of construction should be steel. That was the knell of the iron navy — although as a matter of fact, iron had never fully replaced wood. Meanwhile there was not a plant in the United States capable of making forgings for guns of more than 6-inch caliber — nor one able to make armor plate or torpedoes or machine guns. In May 1887 contracts were signed with the Bethlehem Iron Company for gun forgings and armor plates and in the same year the now great naval gun factory in the Washington Navy Yard was begun.

The Modern Navy.—The first vessels of the new steel fleet were the Dolphin (1884) and the Atlanta, Boston, and Chicago (1885). The increase after 1888 was rapid, the outbreak of the Spanish War of 1898 finding the navy equipped with 77 vessels, including several coast line battleships such as the Iowa, Indiana and Oregon, and the powerful armored cruisers New York and Brooklyn. The war developed the remarkable preparedness of the navy, which practically annihilated that of Spain in a campaign of 110 days. The chief naval event apart from the battles of Santiago and Manila was the famous rush of the Oregon from San Francisco to Jupiter Inlet, Fla., around Cape Horn, a distance of some 14,000 miles in 68 days, which she accomplished without accident, arriving in condition for immediate service.

The navy of the present day is summarized below:

Battleships.—These are distinguished by the arrangement of their turrets and caliber of guns therein. The largest vessels are those of the Louisiana class. They measure 16,000 tons displacement and are about 450 feet in length. The fastest ships — 19 knots per hour — are those of the Georgia class. The chief innovation in turret arrangement is that in which smaller turrets are directly superposed upon larger ones, the large turret having two very heavy guns and the upper or superposed turret, two guns of lighter weight. There has been much controversy over this construction. The classification is as follows:

(*a*) Two Turrets, 12″ guns, Maine, Missouri, Ohio, Texas.

(*b*) Two Turrets, 13″ guns, Alabama, Illinois, Wisconsin.

(*c*) Two Turrets, 13″ guns, and two turrets with 8″ guns superposed, Kentucky, Kearsarge.

(*d*) Two Turrets, 12″ guns, and two turrets with 8″ guns superposed, and two additional 8″ turrets, Virginia, Rhode Island, Georgia, Nebraska and New Jersey.

(*e*) Two Turrets, 12″ guns and four turrets with 8″ guns, Louisiana, Minnesota, Mississippi, Kansas, Iowa, Vermont, Connecticut, and Idaho.

(*f*) Two Turrets, 13″ guns, and four turrets with 8″ guns, Indiana, Massachusetts, Oregon.

Armored Cruisers.— The largest of these vessels are of 14,500 tons displacement, 502 feet long and are capable of steaming 22 knots per hour. They have armored turrets and are classified as follows:

(*a*) Four armored turrets with 8″ guns, Brooklyn.

(*b*) Two armored turrets with 8″ guns, Colorado, California, New York, Pennsylvania, South Dakota, West Virginia.

(*c*) Two armored turrets with 10″ guns, Tennessee, Washington.

There are four single turret harbor defense monitors: Arkansas, Florida, Nevada and Wyoming each carrying two 12-inch and four 4-inch guns, and six double turret monitors, Amphitrite, Monadnock, Miantonomah, Monterey, Puritan and Terror. The last named group — excepting the Monterey — have iron hulls and steel turrets. The Monterey has two 12-inch and two 10-inch guns. Of other vessels the numbers are as follows: Protected cruisers (unarmored steel vessels) 23, unprotected cruisers 3, gunboats 13, light draft gunboats 3, unarmored composite vessels (gunboats) 8; besides iron and wooden craft and small gunboats under 500 tons displacement, tugs, etc.

As compared with other navies, that of the United States stands as follows, all vessels authorized (1904) and building being considered. Battleship strength: Great Britain, first; France, second; Germany, third; Russia, fourth; United States, fifth; Italy, sixth, and Japan seventh. Armored cruiser strength: Great Britain, first; France, second; United States, third; Russia, fourth; Germany, fifth; Italy, sixth; and Japan, seventh.

Guns.—All forgings for naval guns are made of open hearth steel containing nickel. The use of nickel in steel for gun forgings while only of recent development has been found to impart very desirable qualities which vary greatly according to the amount of nickel contained. In general the presence of 3.25 per cent of nickel increases the tensile strength and elastic limit without causing a corresponding reduction in elongation and contraction of area; and the elastic limit is also increased relatively to the tensile strength. This condition indicates toughness. Crystallization after forging is also avoided; and a fine granular or amorphous condition results. This steel is more sensitive to temper, and it is in tempered steel that the improved qualities are most apparent. As shown by the ballistic tests of armor plate, the presence of nickel also materially increases the resistance to shock. Guns are classified into (1) main battery guns, (2) secondary battery guns, (3) field guns and (4) small arms. Main battery guns are either (1) heavy caliber and turret guns, which include 13-inch, 12-inch, 10-inch, and 8-inch, or, (2) intermediate caliber guns which are of the ordinary rapid fire types, represented by the new 7-inch, the 6-inch, the 5-inch and 4-inch guns. All guns of a caliber less than 4 inches are secondary battery or light-caliber guns. All guns of the main battery and a large part of the secondary are of the built up type, the heavy gun having a steel tube jacket, jacket hoops, locking hoops and chase hoops; the last, in recent designs, being carried to the muzzle. The newer types of naval guns are designed for a muzzle velocity of about 3,000 F. S., which represents a more than quadrupling of the muzzle energy with the same weight of projectile, achieved since 1879, when the maximum muzzle velocity was about 1,450 F. S. The term «high power gun» is applied to all having a muzzle velocity of over 2,500 F. S. The interrupted screw and conical spiral thread systems of breech closure are used for all guns of and above 3 inches in caliber. For handling the larger guns hydraulic and electric power are used: and, in the newer vessels, electric power exclusively. Large guns are fired by electricity. The 12-inch gun throws a projectile weighing 850 pounds and is capable at 2,000 yards of penetrating a thickness of 21 inches of either Krupp or Harvey armor. The 7-inch gun throws a projectile of 165 pounds and at the same range will penetrate about 9.7 inches.

The projectiles for large guns are pointed armor-piercing shells of the best quality of steel fitted with a soft steel cap at the extremity and common shell of forged steel and cast iron. Smokeless powder is solely used except for filling shell and ignition purposes. The smokeless powders are all nitro-substitution products and their chief characteristic is that very nearly their entire bulk turns into gas. The present development of naval guns is in the direction of increasing accurate and quick control. Modern 6-inch guns are being fired from ships eight or ten times per minute at targets about the size of the ship, and a mile distant and hitting the target at every shot. The weight of the 6-inch gun with all its turning parts is about 25,000 pounds, and this is directed by one man. There is also a tendency to increase the weight and length of guns, that of the 6-inch gun having augmented from 11,000 to 16,000 to 18,000 pounds. So also the strength of gun metal is increasing. In the large guns it is now equal to a strain of about 50,000 pounds per square inch — and in smaller guns runs as high as 75,000 pounds.

Submarine Torpedoes are of the Whitehead type, driven by a screw propeller actuated by compressed air and controlled by the gyroscope. With an air pressure of 1,500 pounds per square inch, a speed of 30 knots per hour for 1,200 yards has been attained and, with increased pressure and superheating devices, a speed of 35 knots is apparently possible. The desirability of underwater torpedo tubes in ships is in controversy. The great weight of naval opinion is in favor of them. Torpedoes are certainly effective at ranges of 2,000 yards and under, and war vessels unprovided with them lack a weapon of offense, the absence of which is demoralizing to the crews and distinctly disadvantageous.

Armor.—Two kinds of face-hardened steel armor are used in the navy, the Harvey and the Krupp, the former being employed for plates under five inches in thickness. In both, the face of the plate is hardened to a certain depth, leaving the back of tough steel to serve as a support. Wood backing is obsolescent. Krupp plates are used for the main side-belt armor, turrets, conning tower, casemate and intermediate battery protection of battleships. Harvey plates down to 3 inches in thickness are employed for side armor plates, bulkheads, etc. For sighting hoods and other light structures, homogeneous nickel steel is chosen. For the purpose of design it is assumed that Krupp armor will keep out projectiles of a caliber equal to its thickness at moderate fighting ranges; but this in practice is greatly modified by the soft capped projectile which gives an increased penetrating efficiency of about 20 per cent at normal impact. As between guns and armor the gun is ahead. At present 12-inch guns using 850 to 1,000 pound projectiles are mounted in turrets clothed with 12-inch armor. These turrets can be penetrated at any distance at which the projectile is likely to hit, unless the impact is very oblique. Similarly the 6- or 7-inch guns of ships can penetrate the best 6- and 7-inch armor.

Boilers and Engines.— Two kinds of boiler are employed in the large vessels, namely, the steel cylindrical Scotch or water tank and the tubulous or water tube boiler. The principal types of water tube boiler adopted for the battleships are the Babcock & Wilcox and Niclausse. For torpedo boats and destroyers the Mosher, Normand, Seabury and Thorneycroft water tube generators are used. Engines are usually of the two-screw-vertical triple-expansion type.

Navy Organization.—The President of the United States is the commander-in-chief of the navy. Its affairs are administered by the Navy Department, of which the secretary of the navy is the head. The assistant secretary of the navy performs such duties as may be assigned him by the secretary, the most important being the supervision of naval stations in insular possessions, the Marine Corps, War College, building of ships in navy yards and fitting of vessels for sea. The navy is governed by the Articles for the Government of the United States Navy, and statutes of Congress, orders of the President and secretary and a code called Regulations for the Government of the Navy of the United States, last published 1900.

The business of the Navy Department is distributed as the secretary deems expedient among eight bureaus. The Bureau of Yards and Docks controls docks and buildings in Navy Yards. The Bureau of Equipment provides coal, all equipments of ships and electrical appliances afloat, and supervises the Hydrographic Office and distribution of charts therefrom, the Naval Observatory, Nautical Almanac and Compass offices. The Bureau of Navigation promulgates orders, regulates details of officers and enlistment of men, supervises the Naval Academy and all naval educational institutions, the Naval Home, keeps the service records and looks after discipline. The Bureau of Ordnance has charge of armor and armament of all kinds and mechanism thereto pertaining, besides governing the Torpedo Station, naval proving grounds and shore magazines. The Bureau of Construction and Repair designs, builds and repairs ships and supervises docking them. The Bureau of Steam Engineering designs, builds and repairs steam machinery. The Bureau of Supplies and Accounts buys provisions, clothing, small and contingent stores and keeps the accounts of officers and men. The Bureau of Medicine and Surgery looks after the health of the force and controls all laboratories, naval hospitals and dispensaries. The office of the Judge-Advocate General of the Navy is independent of the bureaus and takes charge of courts-martial and courts of inquiry, examines claims against the Department and attends generally to its legal work.

There is a loose sort of co-ordination between the bureaus, and the chiefs form a quasi-cabinet for the secretary. He is not bound by their advice and sometimes disregards it. Chiefs of Bureaus are naval officers nominated by the President and confirmed by the Senate to their office, the term of which is four years. They hold the rank of rear-admiral during incumbency, as does the Judge-Advocate General that of captain in the navy or colonel in the marine corps. The policy of the navy for the last half century has been against permanent officials in the bureaus. It has required officers of all grades to perform short tours of duty in them, so that there has always been an excellent understanding of needs and capacities between the administration and the fleet.

At the present time a proposition to create a general staff to submit plans and policy to the secretary, and then under his authority to direct their execution, thus co-ordinating the work of the bureaus and ensuring permanent and systematic control of the military by the civil power is under discussion. There are already certain permanent boards of naval officers which take part in the administration. The General Board, presided over by the Admiral of the Navy, considers questions of naval policy and strategy and advises the secretary. The Board of Inspection and Survey inspects and reports on the efficiency of ships in commission. The Lighthouse Board controls the lighthouse establishment. For the distribution of navy yards and naval stations see NAVY YARDS. The navy provides vessels and officers for the Commission of Fish and Fisheries and for the nautical schools of Massachusetts and New York. It also maintains naval attachés at the United States embassies and legations at London, Paris, St. Petersburg, Berlin, Rome, Vienna, Tokyo and Peking. Jointly with the Treasury Department it manages the lighthouses and provides officers for their inspection.

Personnel.—Officers are commissioned or warranted. Commissioned officers belong either to the «line» or to the «staff.» The grades of line officers and the number allowed by law in each grade are admiral 1, rear admirals 18, captains 70, commanders 112, lieutenant-commanders 170, lieutenants 300, lieutenants, junior grade, 75, ensigns and midshipmen, indefinite. The staff officers include the Medical Corps, consisting of 15 medical directors, 15 medical inspectors, 56 surgeons, 55 passed assistant surgeons, and 53 assistant surgeons; the Pay Corps of 13 pay directors, 14 pay inspectors, 40 paymasters, 30 passed assistant paymasters and assistant paymasters indefinite. The chaplains of various grades number 24; the professors of mathematics 12, naval constructors 43, civil engineers 24, and admiral's secretary 1. All line officers, excepting a few yearly appointed from the warrant officers, are graduated from the United States Naval Academy (q.v.). Promotion up to rear admiral is by seniority only — subject to physical and professional examination at each step. The office of admiral is personal and expires with the individual holder. The staff officers are promoted by seniority in their several corps. The warrant officers include boatswains, gunners, and carpenters, in each of which corps there are two grades, chief sailmakers, warrant machinists, pharmacists and mates. The great majority are appointed from the enlisted force. Chief warrant officers rank with but after ensigns. Promotion in the warrant grades is by seniority.

Enlisted Men.— Only citizens of the United States can be enlisted. At the present time they form fully 90 per cent of the enlisted force, 79.5 per cent being native born. The total enlisted force is 47,500 men. The recruit must be able to write and speak English, have no physical disabilities, nor be a deserter or a minor under 14 years of age. The age limits vary with the rating — thus on first enlistment, a landsman must be between 18 and 25, unless he has a mechanical trade, when he can enlist up to 35, which is for all ratings the maximum. The enlistment term is four years — no enlistments for special service are allowed. Re-enlistment requires proof of creditable discharge. Enlisted men are classified into chief petty officers, petty officers of the first, second and third classes, and seamen of the first, second and third classes. They are again classified into the seaman branch, artificer branch, special branch and messmen branch. The seaman branch includes such petty officers as boatswains' mates, gun captains, and the like, and ordinary seamen, landsmen, together with the three classes of naval apprentices. The artificer branch includes all the machinists, electricians, carpenters, firemen and coal passers, the special branch, the stewards, hospital attendants and musicians, and the messmen branch, the cooks, stewards and mess attendants. Petty officers are appointed by captains of ships from the enlisted force. Two years' service at sea is required for rating as ordinary seaman and four years for seaman. Gun pointers are selected for merit and any one is eligible who shows the necessary natural aptitude. Those who become expert receive as high as $10 per month in addition to their regular pay.

Apprentices are enlisted between the ages of 16 and 17 with the consent of parents or guardians and must engage to serve until 21. They are instructed in the rudiments at the training station at Newport, R. I., and at San Francisco, Cal., for six months and then go to the training ships for a year's cruise at sea, after which they are promoted from the third class to the second, and assigned to the fleet. One year later they are rated in the first class and are eligible for petty office. Their instruction is continued during their apprenticeship and they have other special privileges.

Pay.—The pay of the commissioned officers of the line at sea or on shore duty beyond sea is as follows: Admiral, $13,500; rear-admirals, first nine, $7,500; second nine, $5,500; captains, $3,500; commanders, $3,000; lieutenant commanders, $2,500; lieutenants, $1,800; junior lieutenants, $1,500, and ensigns, $1,400. Officers of the medical and pay corps receive the pay of their corresponding grades. All salaries (excepting that of the Admiral) are reduced 15 per cent during shore duty in the United States. All grades below rear-admiral are entitled to longevity increase of 10 per cent for every five years' service, until 40 per cent of the full yearly pay of the grade is reached. Midshipmen receive $500 per year at the Naval Academy and $950 per year with the fleet. The maximum pay of chaplains is $2,800, of professors of mathematics and engineers $3,500, and of naval constructors $4,200. All warrant officers except mates, whose pay ($900) is stationary, receive $1,200 during the first three years after appointment, increasing after 12 years to $1,800. The pay of chief petty officers is from $70 to $50, other petty officers from $65 to $30, and seamen from $35 to $9 per month. There are various special allowances and rewards for particular service — for which see the yearly Naval Register. Retirement of officers is compulsory. at age of 62, also for disability and under certain conditions under Act of 3 May 1899. It is voluntary after 40 years' service and above the grade of lieutenant commander. Retired officers (according to the law under which they retire) receive either three fourths or one half the sea pay of their grade on the active list or one half their leave pay. Enlisted men can retire after thirty years' service and attaining age 50 unless physically disqualified for duty. They receive three fourths of the pay in the rating they held when retired.

The Naval Home at Philadelphia (formerly called the Naval Asylum), built in 1832, provides a retreat for old officers and sailors.

Naval Education.—The educational institutions of the navy are the Naval Academy (q.v.) at Annapolis, Md., the War College at Newport, R. I., and the apprentice training stations at Newport and San Francisco. The Naval Academy founded by Secretary George Bancroft in 1845 as a school for midshipmen studying for promotion, is now the foremost naval college in the world. All of the line officers of the navy with a very few exceptions are its graduates. The students are midshipmen. They are appointed by the secretary of the navy on nomination of Senators and members of Congress and by the President. One midshipman is allowed at the Academy for every member or delegate of the House of Representatives, one for the District of Columbia, two for each State upon recommendation by Senators, and 15 appointed by the President. The course is four years at the Academy, eight months of each year being devoted to study at Annapolis and the remainder to cruises in the practice ships. This is followed by two years at sea prior to promotion to ensign. Candidates must be physically sound, not less than 5 feet 2 inches in height and between the ages of 16 and 20, and must pass a rigid entrance examination, which includes geometry, history and advanced geography. The course covers thorough technical education in gunnery, navigation, marine engineering, languages, law and all other branches required by a naval officer. The standard of efficiency demanded is at least 66⅔ per cent, from which no diminution is allowed. The proportion of graduates to freshmen has been hitherto about 44 per cent. The faculty is mainly composed of graduate naval officers. The new buildings of the Academy recently completed represent an aggregate expenditure of nearly $12,000,000 and form the most magnificent educational structures in the world. The War College, founded by Rear Admiral Stephen Bleecker Luce, U. S. N., in 1883, is established at Newport, R. I. It is not a school, but a place for discussion of naval problems by officers of all grades, forming committees in attendance usually during the summer months. It specially considers matters of strategy, planning of campaigns, etc.

The Marine Corps was established by the Continental Congress in November 1775. It is a part of the Navy and has participated in all its actions. Its grades and pay correspond to those of the Army. It has 1 major-general (commandant), 5 colonels, 50 lieutenant colonels, 10 majors, 55 captains, 55 1st lieutenants and 57 2d lieutenants. Retirement is compulsory at age 64 or for disability, and is voluntary at 30 or 40 years under different laws. Officers are very commonly appointed 2d lieutenants directly from civil life, although many have been selected from graduates of the Naval Academy.

Naval Policy.—It is the policy of the United States, not to have the largest navy, but one which shall be fully adequate for the maintenance of its peace and in every particular of the highest attainable efficiency. At the present time our naval armament is somewhat below the minimum for the work demanded of it. A battleship requires about forty months to build and it takes six years to produce a competent naval officer. So also it takes time to train men to handle the complicated mechanism which is essential to the modern war vessel. The training facilities of the country and the means for obtaining the enlisted force are inadequate. A Naval Reserve is necessary from which to draw men at once in case of need. A Naval Militia (q.v.) co-ordinated with the regular service is also of great value, especially for harbor and coast defense. Several States have established such militia, but its development has been greatly retarded by lack of proper national encouragement and support. The distribution of our naval force in time of peace is in two fleets and four separate squadrons. The North Atlantic fleet includes the east coast of the United States and West Indies, and is divided into the Battleship, the Caribbean and the Coast squadrons. The Asiatic fleet covers the east Asiatic coast and the Philippines and is divided into the Northern and Southern squadrons; the European Squadron, the South Atlantic Squadron which cruises on the east coast of South America, the Pacific Squadron, which ranges over the whole west coast of both continents, and the Training Squadron. See also NAVAL ARCHITECTURE; NAVY, HISTORY OF; NAVAL SERVICE, THE; NAVIES OF THE WORLD.

Bibliography.— For histories of the navy consult: Cooper's (1839); Maclay's (1895–9); Spears' (1897); also Aldrich's 'History of the Marine Corps.' A great deal of information will also be found in Hammersley's 'Naval Encyclopedia' (1881) and subsequent editions. Niles' 'Register and American State Papers' may also be consulted. The 'Official Records of the U. S. and Confederate Navies during the War of the Rebellion' contain all reports and like matter, and are published by the Navy Department. Consult also file of the 'Army and Navy Journal' 1863 to date. For current progress, the yearly reports of the secretary of the navy and of the Bureaus — the publications of the Office of Naval Intelligence and of the United States Naval Institute are indispensable. For the Naval Academy, consult the history of that institution by Park Benjamin, and the yearly 'Registers' obtainable from the superintendent, which give all qualifications for entrance, course, etc. Information as to apprentices, enlistments, etc., are published by the Bureau of Navigation. Fullam and Ward's 'Text Book of Ordnance and Gunnery,' and Beig's 'Steam Boilers,' contain full data relative to their subjects. For government and organization consult 'Regulations for the Government of the Navy' (1900), and for Personnel and Stations, the current 'Navy Register.' For construction of ships consult 'Proceedings of the Institute of Naval Architects and Marine Engineers.'

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Navy of the United States, History of. The following condensed history of the United States Navy embodies all the essential details of every noteworthy sea fight in which this country has been engaged from 1775 to 1900. Leading incidents of legislative and popular interest are also included, all being compiled from the most authentic official and historical sources.

1775. June 12 — First sea fight of the Revolution off Machias, Me. Two small coasting vessels manned by volunteers (armed chiefly with axes and pitchforks) under command of Jeremiah O'Brien, captured, after a severe battle, the English war cutter *Margaretta*, Lieut. Moore. Americans, 1 killed, 6 wounded; English, 5 killed, 9 wounded.

1775. July 12 — Two American trading vessels (armed for the emergency) attacked and captured, in Bay of Fundy, two regular English cruisers which had been fitted out expressly to avenge the *Margaretta*. Jeremiah O'Brien, again, was American commander.

1775. Oct. 13 — First official step toward the establishment of United States Navy, Silas Deane, John Adams, and John Langdon ("Fathers of Our Navy") being appointed a committee by Congress to fit out two war ships to cruise against the British.

1776. Jan. 15 — Seventeen volunteers put out of Newburyport, Mass., in three whale boats (under Capt. Offin Boardman) and by clever stratagem captured an armed ship laden with provisions consigned to the British army at Boston.

1776. Jan. —— First flag ever unfurled aboard an American warship was hoisted by 1st Lieut. John Paul Jones on board the flagship *Alfred*, at Philadelphia. It was the "grand union" flag having 13 American stripes with the English union jack in the field.

1776. Feb. 17 — First regularly organized naval expedition of the United States put to sea under the orders of Capt. Esek Hopkins. Its object was the capture of the Island of New Providence, in the Bahamas, where there were large quantities of military stores. The fleet consisted of the 24-gun ship *Alfred*, 20-gun ship *Columbus*, 14-gun brigs *Andrea Doria* and *Cabot*, 12-gun brig *Providence*, 10-gun sloop *Hornet*, and 8-gun schooners *Wasp* and *Fly*.

1776. Mar. 3 — American sailors and marines from Hopkins' fleet landed at New Providence, captured the two forts, made prisoner of Governor Brown, held the place two weeks and, on 17 March, sailed with the military stores.

1776. Apr. 6 — While entering Long Island Sound, Hopkins' fleet was attacked by the English 20-gun cruiser *Glasgow*, which was driven off only after a spirited action of several hours. The next day the fleet arrived at New London.

1776. Apr. 17 — American cruiser *Lexington*, Capt. John Barry, captured English cruiser *Edward* after fighting one hour. Americans, 2 killed, 2 wounded; English loss much greater.

1776. May 9 — American 8-gun schooner *Wasp*, Capt. Charles Alexander, captured English armed vessel *Betsey*.

1776. June 17 — Connecticut State cruiser *Defense*, Capt. Harding, after an all day fight, captured two English transports, having on board about 300 soldiers of the British 71st Regiment, their major (Menzies) was among the killed.

1776. July 4 — On this day England had on the North American coast 78 war ships, mounting 2,078 guns. The American Navy at the same time consisted of 25 war ships, 422 guns. Of these ships only 6 were built for war purposes.

1776. Sept. 1 — Captain John Paul Jones, in command of the 12-gun cruiser *Providence*, escaped from 28-gun English frigate *Soleboy*, by an extraordinary maneuver.

1776. Oct. 11 — First Battle of Lake Champlain. The American flotilla, of 15 vessels, carrying 88 guns and 700 men, under command of General Benedict Arnold, made a stubborn fight against the English flotilla of 25 vessels, 89 guns and 1,000 men, under Capt. Pringle. The American fleet was manned and officered mostly by soldiers, while the English craft were manned by men from the Royal Navy. Although the Americans were defeated they inflicted irreparable loss and delay on the enemy.

1776. Nov. 13 — American 24-gun ship *Alfred*, Capt. Hoysted Hacker, captured English transport *Mellish*, and with valuable supplies for Gen. Burgoyne's army then at Montreal. Among the stores were 10,000 suits of uniform.

1776. Dec. 31 — During the year 1776 the Americans captured 342 English vessels. An English account says that the damage to the West India trade alone was nearly $2,000,000.

1777. Mar. —— English 28-gun frigate *Milford* captured 14-gun American brig *Cabot*, Capt. Joseph Olney.

1777. Apr. 9 — 28-gun American frigate *Trumbull*, Capt. Dudley Saltonstall, captured two English armed transports off New York laden with military stores.

1777. May 7 — American cruiser *Surprise*, Capt. Gustavus Conyngham, in the English Channel, captured British packet *Prince of Orange*. So unexpected was the presence of Yankee war ships in this part of the world that Capt. Conyngham had entered the English cabin, where he interrupted the latter's breakfast, before the presence of an enemy was known.

1777. May —— About the middle of May the 32-gun frigate *Hancock* captured the English 28-gun frigate *Fox*. American casualties, 8 killed or wounded; the English, 32.

1777. June 1 — American frigate *Hancock* captured by English squadron off Halifax.

1777. June 14 — Design of present American flag adopted: the 13 stripes representing the original 13 states and a star for each state in the Union.

1777. Aug. —— In this month the first sub-marine boat ever invented made an attack on the British frigate *Cerberus*, which, had it not been for imperfect mechanism, the craft would have been totally destroyed. Four of her crew were killed.

1777. Sept. 3 — On the night of this day the 32-gun frigate *Raleigh*, Capt. Thomas Thompson, stole into a fleet of English merchantmen and attacked the convoying war ship *Druid*. The *Druid* was reduced to a sinking condition before Americans were driven off by superior forces.

1777. Sept. 20 — The 16-gun cruiser *Lexington*, Capt. Henry Johnston, captured the British 10-gun cruiser *Alert*, after two hours' spirited fighting and a chase of four hours. The English commander, Lieut. Bazely, afterward became an admiral.

1777. Nov. 13 — Capt. John Paul Jones, in 18-gun American cruiser *Ranger*, while in Quiberon Bay, France, received the first salute to the Stars and Stripes in Europe.

1777. Dec. 31 — In 1777 the Americans captured 467 vessels from the English.

1778. Jan. 1 — At the beginning of the year 1778 the British had on the North American station 89 war ships with a total of 2,576 guns, while the Americans had 14 vessels with 332 guns.

1778. Jan. 27 — Sailors from the U. S. 12-gun ship *Providence* landed on the island of New Providence, captured the forts and 7 vessels in the harbor and carried away a large quantity of military supplies.

1778. Mar. 7 — Our 32-gun frigate *Randolph*, Capt. Nicholas Biddle, in order to protect a convoy of merchantmen, attacked the 74-gun ship of the line *Yarmouth*. The *Randolph* was blown up, all but four of her 315 people perished.

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1778. Mar. 9 — The 24-gun ship *Alfred* captured by two English war ships.

1778. Apr. 22 — Capt. John Paul Jones lands at Whirehaven, England, and sets fire to the shipping in the harbor.

1778. Apr. 24 — Action between the *Ranger,* Capt. Jones, and the *Drake,* Capt. Burdon, in the Irish Sea. The Americans captured the *Drake* after an action of one hour. Casualties: Americans 8; English 42.

1778. Sept. 27 — Our 32-gun frigate *Raleigh,* after a chase of several days, captured by English after being run ashore on the coast of Maine; all the crew escaped.

1779. Feb. 2 — First and only serious mutiny in the U. S. Navy occurred in the 32-gun frigate *Alliance* at sea, while under a French commander, Pierre Landais, Gen. Lafayette being on board as a passenger.

1779. May 7 — Our 12-gun brig *Providence,* after desperate action of one hour, captured English war ship of about the same force. The enemy lost 27 out of a crew of only 53. The Americans had 4 killed and 10 wounded.

1779. Sept. 23 — Famous action between *Bonhomme Richard,* Capt. John Paul Jones, and English frigate *Serapis* off eastern coast of England. Early in the battle the ships anchored side by side. The Englishman was carried by boarding. Shortly afterward the *Bonhomme Richard* sank.

1780. June 2 — One of the most obstinate naval battles of the Revolution fought between 28-gun frigate *Trumbull,* Capt. James Nicholson, and English privateer *Watt.* The *Trumbull* was dismasted and the *Watt* escaped. The American loss was 39; that of the enemy, 92.

1780. July 9 — Massachusetts State cruiser *Protector,* Capt. J. F. Williams, blew up the English privateer *Admiral Duff.* Only 55 of the Englishmen were saved. Americans lost 6 killed or wounded.

1780. Aug. 13 — A large American naval and military force was captured on this day at the mouth of the Penobscot River, Me., by the British under Sir George Collier. Three of our Government cruisers and a number of privateers were lost.

1780. Oct. 8 — U. S. ship *Saratoga* captured English armed ship *Charming Molly.* A few days afterward the *Saratoga* was lost at sea with all hands.

1781. May 28 — Our 28-gun frigate *Trumbull* captured by British squadron in a night attack; many of the American crew being in a state of mutiny.

1781. June 22 — U. S. 32-gun frigate *Confederacy* captured at sea by two English frigates while returning from France with military supplies.

1781. Aug. —— Our 28-gun frigate *Trumbull,* Capt. James Nicholson, captured off Halifax by two British frigates.

1782. Apr. 8 — The Pennsylvania State cruiser *Hyder Ally,* Capt. Joshua Barney, in a desperate battle defeated English cruiser *General Monk* in Cape May Roads. Our casualties were 15; that of the English, 53.

1783. In the Revolution the British had 202 war ships captured or destroyed. In all there were about 800 vessels taken from the British by our sea forces.

1785. July 25 — American schooner *Maria* of Boston seized by Algerian corsairs and her crew thrown into captivity. This resulted in a naval war against all the states of Barbary.

1794. Mar. 27 — On the close of the Revolution the Navy was disbanded and it was not until this day that Congress took steps to create a new Navy. By this act six frigates were authorized. They were the famous group to which the *Constitution,* etc., belonged.

1798. Apr. 30 — Secretary of the Navy added to the President's cabinet, Benjamin Stoddart being the first Secretary.

1798. July 9 — Congress declared naval war upon France because of the persistent depredations on our commerce by French cruisers and privateers.

1798. Nov. 16 — Our 20-gun war ship *Baltimore,* Capt. Isaac Phillips, boarded by the British 74-gun ship *Carnatic,* while at sea, and several of the American crew were impressed out of her. This was one of the outrages that led to the War of 1812.

1799. Feb. 9 — Our 36-gun frigate *Constellation,* Capt. Thomas Truxtun, fought and captured French 40-gun frigate *Insurgent,* Capt. Barraeut, after an action of over one hour. Our losses were 5 killed or wounded, while that of the French was 70.

1800. Feb. 2 — *Constellation* had a running fight with the French 40-gun frigate *Vengeance,* Capt. A. M. Pitot, which lasted five hours. Owing to the damages in his rigging, Capt. Truxtun was unable to capture his opponent, who finally escaped. American casualties, 39 killed or wounded; French, 160.

1800. July 14 — The captured French frigate *Insurgent,* Capt. Patrick Fletcher, sailed on a cruise in the West Indies and was never heard from. This was one of the first great disasters in the U. S. Navy.

1800. Oct. 12 — The 28-gun frigate *Boston,* Capt. George Little, in a two day fight with the French corvet *Berceau,* Capt. Andre Senez, finally captured her.

1801. Feb. 3 — Treaty of peace with France ratified. In this war 84 armed vessels were captured from the French, while the French captured only one of our war ships, the *Retaliation.*

1801. May 14 — The Bashaw of Tripoli declared war against the United States because we did not pay our "tribute" promptly. About the same time other potentates of the semi-piratical states of Barbary began hostile measures against the United States.

1801. July 1 — First considerable squadron of American war ships crossed the Atlantic and arrived at Gibraltar. It consisted of the frigates *President, Philadelphia* and *Essex,* under the command of Capt. Richard Dale, and was sent to make war on the states of Barbary.

1801. Aug. 1 — Our 12-gun schooner *Enterprise,* Lieut. Andrew Sterrett, in a three-hour fight with the Tripolitan war polacre *Tripoli,* captured her. There were no American casualties, but the Tripolitans had 50 killed or wounded.

1803. June 22 — American squadron under the command of Capt. John Rodgers, attacked a large Tripolitan war ship and nine gunboats off the harbor of Tripoli. The gunboats were driven into the harbor; the war ship was destroyed.

1803. Oct. 31 — While chasing a Tripolitan craft, the 36-gun frigate *Philadelphia,* Capt. William Bainbridge, ran aground off the harbor of Tripoli. The following day he was compelled to surrender.

1804. Feb. 16 — Lieut. Stephen Decatur with 74 volunteers manned the ketch *Intrepid* and, under cover of night, ran into the harbor of Tripoli and destroyed by fire the frigate *Philadelphia,* which the Tripolitans had captured the year before.

1804. Aug. 3 — Americans began that series of bombardments on Tripoli which resulted in the capture of the place.

1804. Sept. 4 — Richard Somers with 11 volunteers manned the ketch *Intrepid* (which had been fitted as a floating mine to be exploded among the Tripolitan shipping) and, under cover of night, carried her into the harbor of Tripoli. The ketch was exploded and every one of the Americans was killed.

1805. June 3 — Treaty of peace signed with Tripoli.

1807. June 22 — Our 36-gun ship *Chesapeake,* Capt. James Barron, attacked off the Virginian coast by the 50-gun English frigate *Leopard* and was compelled to surrender. Three of the American crew were taken aboard the English ship. This outrage hastened the War of 1812.

1811. May 16 — Our 44-gun frigate *President,* Capt. John Rodgers, at night, was fired upon by the English 22-gun war ship *Little Belt.* The Americans promptly returned the fire and compelled the English to surrender. After which the *Little Belt* was permitted to proceed.

1812. June 18 — Congress declares war against Great Britain. At that time England had 1,048 war ships with 27,800 guns, and the United States 17 war ships with 442 guns.

1812. July 31 — Our 3-gun schooner *Julia* attacked in the St. Lawrence river near Ogdensburgh by the English war craft *Earl of Moira* and the *Duke of Gloucester.* The English were driven off with heavy losses.

1812. Aug. 13 — First naval action of the War of 1812. The 32-gun frigate *Essex,* Capt. David Porter, captured the English 16-gun sloop of war, *Alert.* Only 3 of the enemy were wounded. No American casualties.

1812. Aug. 13 — First frigate action of the war, the 44-gun frigate *Constitution,* Capt. Isaac Hull, capturing the English 38-gun frigate *Guerriére,* Capt. James Richard Dacres. The battle lasted only 40 minutes, the Americans having 14 killed or wounded and the enemy 78.

1812. Oct. 7 — At night a boat party of Americans on Lake Erie attacked and captured the English war craft *Detroit* and *Caledonia* near Buffalo. The Americans were led by Lieut. Jesse Duncan Elliott.

1812. Oct. 17 — Our 18-gun sloop of war *Wasp,* Capt. Jacob Jones, after an action of 43 minutes, captured the English 18-gun war brig *Frolic.* The Americans had 10 killed or wounded, and the English 62.

1812. Oct. 25 — The 44-gun frigate *United States,* Capt. Stephen Decatur, after an action of an hour and a half, captured the English 38-gun frigate *Macedonia*, Capt. John Surnam Carden. Our casualties were 12 killed or wounded; the enemy lost 104.

1812. Dec. 29 — Capt. William Bainbridge in the 44-gun frigate *Constitution* captured, off the coast of Brazil, the English 38-gun frigate *Java* after an action lasting nearly two hours. The Americans had 34 killed or wounded; the English, 161.

1813. Feb. 24 — The 18-gun sloop of war *Hornet*, Capt. James Lawrence, captured, after a sharp action of 15 minutes, English sloop of war *Peacock* of the same force, her commander, William Peake, being killed. The American casualties were 5 killed or wounded; that of the enemy, 38. The *Peacock* was sunk in the action.

1813. June 1 — American 36-gun frigate *Chesapeake*, Capt. James Lawrence, captured after a desperate action of 15 minutes off the port of Boston, by the English 38-gun frigate *Shannon*, Capt. Philip B. V. Broke. The Americans had 146 killed or wounded and the English 83. Lawrence was killed, his last words being "Don't give up the ship."

1813. Aug. 14 — The American 18-gun sloop of war *Argus*, Capt. Wm. Henry Allen, captured off English coast by British war ship *Pelican* (of the same force), Capt. John Fordyce Maples, after a severe action of 47 minutes, in which the American commander was mortally wounded. The Americans had 23 killed or wounded; the English 7.

1813. Sept. 4 — The 12-gun schooner *Enterprise*, Capt. William Burrows, captured English sloop of war (of the same force) *Boxer*, Capt. Samuel Blythe, after an action of 40 minutes, off Monhegan, on the coast of Maine. Both the American and English commanders were killed. Our casualties were 12 killed or wounded; that of the English, 21.

1813. Sept 10 — Battle of Lake Erie fought. The American squadron carrying 54 guns, under the command of Oliver Hazard Perry, captured the English squadron of 63 guns under the command of Capt. Robert Heriot Barclay. Our casualties were 123 killed or wounded; that of the British, 135. The direct result of this battle was the overthrow of British supremacy in the Western territory.

1814. Jan. 29 — The U. S. schooner *Alligator* repulsed a boat attack from the British frigate *Narcissus* with heavy loss to the enemy.

1814. Mar. 28 — Capt. Davis Porter in the 32-gun frigate *Essex* made a heroic defense against the British war ships *Phœbe* and *Cherub* at Valparaiso, Chile. After a fight of 2 hours and 20 minutes the *Essex* surrendered, our losses being 155 killed or wounded; that of the English, only 15.

1814. Apr. 29 — Our 20-gun sloop of war *Peacock*, Capt. Lewis Warrington, after an action of 45 minutes, captured the English sloop of war (of the same force) *Epervier*, Capt. Richard Wales. American loss, 2 killed or wounded; English, 23.

1814. June 28 — Capt. Johnston Blakeley in the 18-gun sloop of war *Wasp*, captured the English war ship *Reindeer* off the English coast after an action of 19 minutes, the Americans having 26 killed or wounded as against 67 for the enemy.

1814. Sept. 1 — At night the *Wasp* had a battle with the English sloop of war *Avon* of less force. The *Avon* was sunk after an action of 43 minutes in which the Americans had 3 killed or wounded and the enemy 42.

1814. Sept. 11 — Second battle of Lake Champlain between American squadron under Capt. Macdonough and English under Capt. Daniel Pring. The American force carried 86 guns and 850 men, the English 92 guns and 1,000 men. After an action of 2 hours and 20 minutes the English were defeated, our losses being 110 killed or wounded; that of the enemy, 194.

1814. Dec. 14 — Forty-two English launches, containing 42 guns and about 1,000 men attacked the American flotilla on Lake Borgne, Miss., and after a spirited fight defeated it, the American casualties being 41 killed or wounded; the English, 94.

1815. Jan. 15 — The 44-gun frigate *President*, Capt. Stephen Decatur, captured by a British squadron after a chase of two days. The Americans did not surrender until they had 80 killed or wounded and the enemy 25.

1815. Feb. 20 — While cruising off the coast of Portugal the 44-gun frigate *Constitution*, Capt. Charles Stewart, after an extraordinary night battle, captured English war ships *Cyane* and *Levant*, having a total of 55 guns as opposed to the 51 in the *Constitution*. Our casualties were 14 killed or wounded; the English, 77.

1815. Mar. 23 — The 18-gun sloop of war *Hornet*, Capt. Biddle, after a spirited action off Tristan d'Acunha, captured English sloop of war *Penguin* of the same force in 22 minutes. American casualties, 12 killed or wounded; the English, 38.

1815. June 17 — Before the war with England had been concluded the U. S. had declared war on Algiers as the result of outrages on American merchantmen. A squadron under Capt. Decatur appeared in the Mediterranean and on June 17th captured the Algerian flagship *Mashouda*.

1815. June 30 — While in the Straits of Sunda (East Indies) the 18-gun sloop of war *Peacock*, Capt. Warrington, captured English cruiser *Nautilus* of 12 guns, the enemy having 14 killed or wounded. There were no American casualties.

1821. From this year to the close of 1825 our naval forces were actively engaged in suppressing piracy in the West Indies and slave trade on the African coast.

1832. Feb. 7 — For making a murderous attack on American merchantmen, the 44-gun frigate *Potomac* landed a large force of men in Sumatra and attacked the town of Qualla Battoo, killing a large number of the natives and destroying their forts.

1838. Dec. 20 — Qualla Battoo again bombarded, for repetition of outrages; this time by the corvet *John Adams*, Capt. George C. Reid.

1846. July 2 — A force of 250 men from American squadron under Capt. John Drake Sloat, landed at Monterey, Cal., and occupied the place in the name of the United States.

1846. Oct. 16 — American naval force under Capt. David Conner made unsuccessful attempt to capture Tuspan, Mex.

1846. Oct. 26 — Naval force under command of Capt. Matthew Calbraith Perry captured, after a severe fight, Mexican city of Tabasco.

1846. Nov. 20 — Boat containing 7 Americans, under command of Lieut. Parker, entered harbor of Vera Cruz, at night, boarding the enemy's bark *Creole* (laden with munitions of war), burned her under the guns of the fort.

1847. Jan. 8 — Capt. Robert F. Stockton led a force of about 700 American sailors on a long march inland and defeated a Mexican army at San Gabriel, Cal. The battle was resumed on the following day at Mesa and again the enemy was routed. On the 15th our sailors marched into Los Angeles in triumph; having actually conquered the lower part of California.

1847. Mar. 10 — Steam cruiser *Spitfire* ran into the harbor of Vera Cruz and, single-handed, engaged the Mexican batteries.

1847. Mar. 23 — Commander Tattnall with seven small gunboats boldly ran within close range of the heaviest fort at Vera Cruz and delivered a terrific fire for an hour. So unexpected was the attack that the Mexicans were scarcely able to reply.

1847. Mar. 24–25 — The navy and army maintained the furious attack on Vera Cruz which, finally, resulted in the surrender of that place.

1847. June 14 — Strong naval force under Capt. M. C. Perry captured Tuspan after severe fighting. At one time our sailors landed and carried the Mexican earthworks by storm.

1847. June 30 — Capt. Bigelow with 240 sailors marched against the town of Tamultay and captured it after suffering a loss of 2 killed and 5 wounded.

1847. Oct. 1 — A force of 80 sailors under Lieut. Craven landed at Mulije, Lower California, and defeated a superior number of Mexicans, driving them several miles inland.

1847. Nov. 10 — Capt. Shubrick landed 600 men from his squadron and captured the city of Mazatlin, Mexico.

1847. Nov. 17 — A force of sailors under Commander Selfridge captured the city of Guaymas, Lower California, after severe fighting.

1848. Jan. 30 — Lieut. Yard with a detachment of sailors landed and surprised a body of Mexican troops near Cochori, Lower California.

1848. Feb. 6 — Lieut. Charles Heywood of the Marines made an attack on the Mexicans at San Jose, Lower California. Attack was renewed the next day and the enemy defeated with a loss of 15 killed or wounded.

1853. July 14 — Com. M. C. Perry landed his expedition at Yokohama, Japan, and formally delivered the message of friendship from the President of the United States to the Emperor. It resulted in the opening of Japan to foreign commerce.

1854. Feb. 12 — Perry appeared off Tokyo with an imposing fleet to receive the answer from the Emperor.

1856. Nov. 20 — Because the Chinese forts wantonly fired on the American at Canton, a large force of sailors and marines was landed under Commander Andrew Hull Foote, and, after a two days' fight, the Chinese were defeated with a loss of about 400 killed or wounded; the Americans having 12 killed and 28 wounded.

1859. June 25 — Capt. Tattnall made his famous dash to the assistance of the British and French who were sorely pressed in their attack on the Peiho forts, North China. It was on this occasion that Tattnall exclaimed "Blood is thicker than water."

1861. Apr. 21 — Capt. McCauley destroyed all United States stores at Norfolk, Va., to prevent their falling into the hands of the Confederates.

1861. May 31 — With frail gunboats Commander James Harman Wood attacked the Confederate batteries at Aquia Creek, near Washington, D. C. The attack was renewed the next day, but failed; the Nationalists having 1 killed (Commander Ward) and 4 wounded.

1861. Aug. 29 — Capt. Silas H. Stringham with a powerful squadron of wooden war ships bombarded Fort Hatteras and compelled the surrender of its garrison of 615 men. The Confederate loss was 29 killed or wounded.

1861. Sept. 10 — Two gunboats commanded by Lieut. Roger N. Stembel opened fire on a Confederate battery of 16 guns near Columbus, Ky., and destroyed it.

1861. Sept. 14 — A boat party under Lieut. John Henry Russell pulled into the harbor of Pensacola and, after a desperate fight, captured and destroyed the Confederate privateer *Judah*. About 20 of the boat party were killed or wounded; enemy's loss, unknown.

1861. Oct. 1 — The improvised Union gunboat *Fanny*, while operating in Pamlico Sound, N. C., was captured in a daring manner by a party of Confederates under Capt. Wm. F. Lynch.

1861. Oct. 5 — A regiment of Confederate troops while marching on the narrow island of Hatteras was fired upon by the National gunboat *Monticello*, Lieut. Daniel L. Braine, and routed with great loss.

1861. Oct. 12 — Capt. George Nicholas Hollins with the Confederate ironclad *Manassas* and 6 wooden steamers came from New Orleans and put to flight the powerful Union squadron stationed near the mouth of the Mississippi River. The *Richmond* was nearly sunk and, by means of fire rafts, the enemy compelled our ships to flee.

1861. Oct. 28 — The little wooden gunboat *Conestoga*, Lieut. S. Ledyard Phelps, attacked a Confederate camp on the bank of the Cumberland River, inflicting a loss in killed and wounded.

1861. Nov. 7 — Capt. Samuel Francis Dupont with a powerful squadron of wooden ships captured, after a heavy bombardment, Port Royal, N. C., with a loss of 31 killed or wounded, the enemy's loss being 63.

1861. Nov. 8 — Union war steamer *San Jacinto*, Capt. Charles Wilkes, intercepted the English mail steamer *Trent* on the high seas and forcibly took out of her two Confederate agents, Mason and Slidell.

1861. Nov. 8 — Lieut. James E. Jouett led a boat party into the harbor of Galveston, Texas, under cover of night, and destroyed the war schooner *Royal Yacht*. The boat party had 9 casualties. The entire Confederate crew was captured.

1862. Feb. 6 — Capt. A. H. Foote with Union gunboats attacked Fort Henry on the Tennessee River and after a severe action compelled its surrender. The Union loss was 11 killed or wounded; the Confederate loss, 16.

1862. Feb. 10 — Union gunboats under Commander Rowan attacked the Confederate gunboats at Elizabeth City, N. C., and defeated them. The Union loss was 4 killed or wounded; that of the enemy, unknown.

1862. Feb. 13 — Commander Walke in the ironclad gunboat *Carondelet* attacked Fort Donelson, Cumberland River. After maintaining an all-day fight single-handed she retired at dark with several casualties.

1862. Feb. 14 — Union gunboats under Capt. Foote made a determined attack on Fort Donelson and compelled it to surrender, the Union loss being 54 killed or wounded.

1862. Mar. 8 — Confederate ironclad *Merrimac* entered Hampton Roads and, in spite of the terrific fire, totally destroyed the war ships *Congress* and *Cumberland*. The Unionists had 254 killed or drowned, besides many wounded; the Confederate loss was only 21 killed or wounded.

1862. Mar. 9 — The famous battle between the *Monitor* and *Merrimac* fought, in which the latter was finally driven off. Owing to the protection afforded by the armor none was killed and only a few wounded.

1862. Mar. 14 — Naval force under Lieut. R. S. McCook captured the city of New Berne after a desperate fight in which the navy had 11 killed or wounded, while our land force suffered much more. The enemy's loss was even heavier.

1862. Apr. 4 — Commander Walke in the *Carondelet* made his celebrated dash past the batteries at Island No. 10 in the Mississippi, which resulted in the abandonment of that post by the enemy.

1862. Apr. 6 — Two wooden Union gunboats prevented the annihilation of the Union army at Pittsburg Landing, on the Tennessee River, by pouring in a cross-fire on the charging Confederates.

1862. Apr. 23 — Farragut, under cover of night, made his famous dash past Forts Jackson and St. Philip, which resulted in the fall of New Orleans. It was one of the most daring feats in naval history. The Union loss was 184 killed or wounded, while that of the enemy was about equal.

1862. Apr. 25 — A naval force under Commander Samuel Lockwood captured Fort Macon, N. C., after an all-day fight.

1862. May 10 — On this day the Confederate naval force in the Mississippi made a sudden attack on the Union naval force near Fort Pillow, but were finally driven off with a loss of three killed or wounded.

1862. June 6 — Union gunboats under Capt. Davis attacked the Confederate naval force at Memphis and defeated it. The casualties were inconsiderable.

1862. June 17 — A naval and land force captured St. Charles on the White River, after a bloody struggle in which 150 of the Unionists were killed or wounded. The Confederate loss is unknown.

1862. June 28 — Farragut made his perilous dash past the Confederate batteries at Vicksburg, with a loss of 37 killed or wounded. The enemy reported no losses.

1862. July 4 — Commander Trenchard in the *Rhode Island* dispersed Confederate troops at Galveston, and destroyed the blockade runner *Richard O'Brien*, with its valuable cargo.

1862. July 9 — Two gunboats and 40 soldiers under Lieut. Charles W. Flusser forced the barricades in Roanoke River and, after a hot fight, captured Hamilton, N. C. Union losses, three killed or wounded.

1862. July 15 — Capt. Walke with a small squadron attacked the ironclad *Arkansas* in the Yazoo River. A running fight followed, the *Arkansas* speeding down the Yazoo into the Mississippi and past the great Union fleet and took refuge under the Vicksburg batteries. That night the Union fleet attacked the ram and so injured her that she was of little service. The Unionists lost 68 killed or wounded, while that of the ram was 25.

1862. July 22 — Capt. Wm. D. Porter, with several gunboats, made another attack on the *Arkansas* and completed her destruction.

1862. Oct. 3 — A detachment of troops with a naval force under Lieut. E. R. Colhoun, captured Franklin after severe fighting in which 15 of our seamen were killed or wounded.

1862. Nov. 24 — While attempting to capture the town of Onslow, N. C., Lieut. Wm. B. Cushing, in the gunboat *Ellis*, ran aground and was attacked by the Confederates. Cushing pluckily defended his vessel two days, then setting her on fire escaped with the survivors.

1862. Dec. 31 — On the night of this day the famous *Monitor* foundered at sea while near Hatteras Shoals, her people being saved by convoying ships.

1863. Jan. 1 — Before daylight two Confederate "cotton-clad" steamers made a sudden attack on the Union squadron off Galveston, captured one vessel, destroyed another and dispersed the force with heavy loss.

1863. Jan. 9 — Rear-Admiral Porter, with a strong force of gunboats, captured Arkansas Post, on the Arkansas River, with a loss of 31 killed or wounded; Confederate losses being heavier.

1863. Jan. 11 — On this day the famous Confederate cruiser *Alabama* sank the National cruiser *Hatteras* off Galveston, after a short fight, the Confederates rescuing the survivors.

1863. Feb. 14 — The Confederates captured the Union warship *Queen of the West*, which had run aground in the Red River.

1863. Feb. 24 — Refitting the *Queen of the West*, the Confederates captured the new ironclad *Indianola* after a hot fight in the Mississippi River.

1863. Feb. 28 — Commander Worden in the monitor *Montauk*, at long range, destroyed the Confederate blockade runner *Nashville*.

1863. Mar. 11 — Union gunboats began attack on Fort Pemberton on the Tallahatchie River, but were finally repulsed on the 18th with a heavy loss in killed and wounded.

1863. Mar. 14 — Farragut passed Port Hudson, on the Mississippi, one of his ships, the *Mississippi* (on which was Lieut. Geo. Dewey) being destroyed by fire. The Unionists had nearly 100 killed or wounded.

1863. Apr. 7 — Ironclads under Dupont off Charleston made a determined attack on the fortifications. The *Keokuk* was sunk and the other vessels were compelled to retire.

1863. Apr. 16 — Rear-Admiral Porter ran his fleet past Vicksburg with little loss.

1863. Apr. 29 — Union gunboats made an unsuccessful attack on Grand Gulf, Mississippi River, in which they had 75 men killed or wounded.

1863. June 17 — Monitor *Weehawken*, Capt. John Rodgers, captured the Confederate ironclad *Atlanta*, Lieut. Wm. A. Webb. The Confederates had 18 wounded; no casualties for the Nationalists.

1863. July 10 — Rear-Admiral Dahlgren made a determined naval attack on the defenses of Charleston in conjunction with our troops, but after a severe action was compelled to retire.

1863. July 15 — While in Shimonoséki Straits, Japan, our warship *Wyoming* was fired on by the Japanese. Capt. McDougal returned the fire, sank some of their ships and silenced their batteries. The Americans had six killed and four wounded. The Japs suffered heavily.

1863. July 18 — A combined land and naval attack was made on Fort Wagner, Charleston, but was repulsed by the Confederates.

1863. Sept. 8 — A boat party consisting of 400 men under the command of Commander T. H. Stevens attempted to surprise Fort Sumter, Charleston, but was repulsed with a loss of 16 killed or wounded and 102 taken prisoners.

1863. Sept. 8 — An army and naval expedition against Sabine Pass was repelled by the Confederates, the Nationalists having about 50 killed or wounded, while the gunboats *Clifton* and *Sachem* were compelled to surrender.

1864. Jan. 30 — The Confederates under Commander J. T. Wood made a night attack on Union gunboats guarding New Berne, N. C., and captured the *Underwriter*, with a loss of 39 killed, wounded and made prisoners; the Confederate loss being 28 killed or wounded.

1864. Apr. 20 — Confederate ram *Albemarle* attacked Union gunboats at the mouth of the Roanoke River, N. C., and sank the *Southfield*, a number of Unionists being killed or wounded.

1864. May 5 — The ram *Albemarle* attacked Union gunboats in Albemarle Sound and, after a desperate fight with our wooden gunboats, lasting several hours, was driven back. Several of the Union gunboats were disabled. The Unionists had 29 killed or wounded; the Confederate loss was less.

1864. May 6 — The Confederates blew up the Union gunboat *Commodore Jones* in Four Mile Creek, killing or wounding half her people. Two days later they destroyed our gunboat *Shawsheen*.

1864. June 19 — The *Kearsarge* sank the Confederate cruiser *Alabama* off Cherbourg, France, after a severe action. The Nationalists had 3 killed or wounded and the enemy 30.

1864. June 24 — Confederate shore batteries opened an unexpected fire on two Union gunboats in the Mississippi, near Port Hudson, but were silenced after an hour of hard fighting.

1864. Aug. 5 — Farragut made his famous dash past the forts at Mobile Bay, and on the same day captured the ironclad *Tennessee*, after one of the most desperate fights in naval history. The monitor *Tecumseh* was sunk while passing over a line of torpedoes, 93 of her crew of 114 perishing. Total Union casualties, 315; that of the Confederates being 32.

1864. Oct. 7 — Commander Napoleon Collins, in the warship *Wachusett*, captured the Confederate cruiser *Florida*, in the Brazilian port of Bahia, by boarding. Afterward the *Florida* was released, the attack being illegal.

1864. Oct. 28 — Lieut. Wm. B. Cushing, in a launch with 16 men, under cover of night, crept up the Roanoke River and destroyed the ironclad ram *Albemarle* by a torpedo.

1864. Nov. 4 — Two Union gunboats under Commander Shirk were destroyed in endeavoring to silence the Confederate batteries on the Tennessee River.

1864. Dec. 24 — First great naval and land attack on Fort Fisher, in which the Unionists were repulsed with a loss of 83 killed or wounded to the fleet alone, while the Confederate casualties were 58.

1865. Jan. 13 — Second naval and land attack on Fort Fisher, by which the fort was captured, our sailors and marines having 351 killed or wounded.

1865. Feb. 17 — Admiral Porter, with a strong naval force, captured Fort Anderson, with a loss of seven killed or wounded.

1866. Sept. —— Schooner *Gen. Sherman* ran aground in Ping Yang River, Corea, and her crew was clubbed to death.

1867. Jan. —— U. S. S. *Wachusett* visited scene of *Gen. Sherman* outrage, but failed to get satisfaction.

1870. Jan. 24 — U. S. S. *Oneida*, while steaming out of the harbor of Yokohama, Japan, homeward bound, was rammed by the English passenger ship, *Bombay*, and sunk; 117 of her 176 men perished.

1871. June 11 — A party from the American squadron attacked Corean forts in the Ping Yang River and carried them by storm, having 10 killed or wounded, Lieut. McKee being among the former.

1885. Mar. 15 — Commander McCalla, with a force of sailors and marines, took possession of the Isthmus of Panama, to protect American interests.

1889. Mar. 15 — The U. S. S. *Trenton*, *Vandalia*, and *Nipsic* wrecked by a hurricane at Apia, Samoa. The *Vandalia* was a total loss. About 50 of our officers and sailors were killed or drowned.

1891. Oct. 16 — A number of Chileans mobbed a party of sailors from the U. S. S. *Baltimore* at Valparaiso, killing 2 and injuring 15. The Chilean Government discountenanced the outrage and made ample atonement.

1894. Feb. 2 — The famous *Kearsarge* wrecked on Roncador Reef.

1898. Feb. 15 — U. S. battleship *Maine* blown up in Havana harbor, with a loss of 260 men out of a complement of 350. This was the second greatest disaster in our navy.

1898. Mar. 19 — Battleship *Oregon* sailed from San Francisco on her famous voyage around the Horn.

1898. Apr. 22 — Rear-Admiral Sampson began the blockade of the north coast of Cuba.

1898. Apr. 25 — United States declared that war with Spain existed from April 21st.

1898. Apr. 27 — Sampson bombarded the Cuban port of Matanzas, silencing the Spanish batteries and preventing the erection of additional fortifications.

1898. Apr. 29 — Commander McCalla drove a Spanish gunboat into the harbor of Cienfuegos.

1898. May 1 — Dewey destroyed the Spanish fleet under Montojo in the harbor of Manila, capturing Cavité and gaining complete possession of the harbor. Our casualties were 6, while that of the enemy was 618.

1898. May 11 — Cervera's squadron arrived off Martinique.

1898. May 11 — Commander Chapman Coleman Todd entered the harbor of Cardenas with the cruiser *Wilmington*, revenue cutter *Hudson*, and torpedo boat *Winslow*. The *Winslow* was suddenly attacked by a concealed battery and driven off in a crippled condition. The *Winslow* had five killed (including Ensign Worth Bagley) and two injured.

1898. May 11 — A boat party from Commander McCalla's squadron advanced on Cienfuegos, and under a terrific fire cut two submarine cables. We had eight killed or wounded.

1898. May 12 — Admiral Sampson bombarded San Juan, Porto Rico, silencing the enemy's guns. Our loss was eight killed or wounded.

1898. June 3 — Hobson made his famous dash with the collier *Merrimac* into the harbor of Santiago. The collier was destroyed and her entire crew made prisoners.

1898. June 6 — Sampson made the first bombardment of Santiago, the Spanish batteries being silenced. We had no casualties, but the enemy admit a loss of 54 killed or wounded.

1898. June 11 — The Spaniards began their attack on our marines at Camp McCalla, Guantanamo Bay. It was continued for several days, when a determined attack of the marines put the enemy to flight. Our loss was 28 killed or wounded; that of the enemy was greater.

1898. June 20 — Capt. Glass occupied the island of Guam.

1898. June 22 — Capt. Sigsbee, in the passenger steamer *St. Paul*, disabled the Spanish torpedo-boat destroyer *Terror*. No casualties for the Americans; the enemy having two killed and several wounded.

1898. June 30 — Lieut. Lucien Young, with small gunboats, silenced the Spanish batteries at Manzanillo.

1898. July 2 — Commander Swinburne destroyed the Spanish fortifications at Tunas, after a spirited action.

1898. July 3 — Cervera's formidable squadron was completely destroyed off Santiago after a spirited battle and chase lasting nearly four hours, by the American fleet under the immediate command of Admiral Sampson.
1898. July 15 — Commander Hunker attacked the Spanish batteries at Baracao. Only two Americans were injured.
1898. July 21 — A handsome dash was made into the port of Nipe by three gunboats under the orders of Commander Hunker, and destroyed the Spanish cruiser *Don Jorge Juan*.
1898. July 25 — Commander Richard Wainwright, in the *Gloucester*, occupied the port of Guanica, Porto Rico, being the first regular American force to land on that island in this war.
1898. July 27 — Lieut. Merriam, with two boats' crews, took possession of Ponce, P. R.
1898. Aug. 12 — Capt. Goodrich attacked and compelled the surrender of Manzanillo.
1898. Aug. 13 — Dewey's fleet assisted army in attack on Manila, which resulted in the surrender of that place; Flag Lieutenant Brumby hoisting the first American colors over the city.

EDGAR STANTON MACLAY, A.M.,
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Nawanagar, nạ-wä-nạ-gär'. See NOWANAGAR.

Naxos, năk'sŏs, or **Naxia,** năk-sē'ä, Greece, an island of the Ægean Archipelago, the largest of the Cyclades, lying east of Paros; length, 18 miles; breadth, 12; area, 170 square miles. It is hilly, beautiful, and extremely productive, yielding fruit, wine, oil, silk, wheat, and barley, while the higher grounds afford pasturage for cattle. Cheese, honey, and wax are exported, as well as wine, oil, fruit, and grain. There are prehistoric quarries of granite, marble, and serpentine; and emery exists in abundance, being exported in large quantities. The chief town or village is Naxos (pop. 2,000), near the northwestern part of the island, on a small bay with a harbor and insecure roadstead. In ancient times Naxos was celebrated for its wine, and played a prominent part in the legends of Dionysus or Bacchus, who is said to have found Ariadne here after she was deserted by Theseus. It was anciently inhabited by Ionians who had emigrated from Athens. Pop. about 20,000.

Naylor, nā'lôr, **James Ball,** American novelist: b. Pennsville, Ohio, 4 Oct. 1860. He was graduated from Starling Medical College, Columbus, Ohio, in 1886, and has since practised medicine and engaged in literary work. He has published: 'Current Coins' (1893); 'Ralph Marlowe' (1901); 'The Sign of the Prophet' (1901); 'In the Days of St. Clair' (1902); etc.

Nazaræans, năz-ạ-rē'ạnz, a Jewish sect mentioned by Epiphanius. The term is probably derived from *Netsir,* a branch, that is, a branch of the true stock. They professed to revert to a patriarchal form of religion and thus to supersede Mosaic Judaism, canonized the 12 patriarchs, but did not exclude Moses and Aaron from their list of saints. According to them the law given to Moses was lost and the extant Pentateuch corrupt. While rejecting the sacrifice of animals and eating no flesh, they kept the Sabbath and the Jewish festivals. They were found in Galaaditis, Basanitis and other regions east of the Jordan.

Nazarene, năz-ạ-rēn', a designation of Jesus Christ. It appears in two forms in the Greek, *Nazarenos,* and *Nazoraios*, both derived from Nazareth. Though this designation occurs 19 times in the New Testament the authorized version only twice renders it «Nazarene» (Matt. ii. 24; Acts xxiv. 5), elsewhere by the words «of Nazareth.» The demoniac uses it in addressing Jesus in the synagogue at Capernaum (Mark i. 24; Luke iv. 34); the people to Bartimæus (Mark x. 47; Luke xviii. 37); the soldiers who apprehended Jesus (John xviii. 5–7); the servants at his trial (Matt. xxvi. 71; Mark xiv. 67); Pilate in the superscription (John xix. 19); the disciples on their way to Emmaus (Luke xxiv. 19); Saint Peter (Acts ii. 22; iii. 6; iv. 10); the false witness against Stephen (Acts iv. 14); the ascended Jesus (Acts xxii. 8); and Saint Paul (Acts xxvi. 9). At first it was applied to Jesus as naturally indicating his birthplace. The Galileans were not highly esteemed; their dialect was debased; the population had become degraded through admixture with the heathen; they were seditious, hence the accusation against Saint Paul as «ringleader of the Nazarenes.» Nazareth was a small, obscure town of Galilee, hence Nazarene became a term of reproach and is still used by Arabs as a general designation for Christians; and the Indian Mutiny is said to have been encouraged by a pretended ancient prophecy that the Nazarenes should be expelled from Hindustan after dominating it for 100 years. See NAZARETH.

Nazarenes, nickname of a certain school of German painters who, both in coloring and technique, professed to reproduce the method and style of Italian painters of the 14th and 15th centuries, Giotto, Fiesole, Perugino. The leaders in this movement were Overbeck, Schadow, Veit, Schnorr and Carolsfeld, who founded at Rome «The Congregation of the Brothers of Saint Isidore.» Schnorr and Schadow later on left the brotherhood. A similar movement in England was initiated by the Pre-Raphaelites (q.v.).

Nazarenes. See EBIONITES.

Nazareth, năz'ạ-rĕth (ancient NASSRA, that is, «flower»; modern ĔN-NASIRAH, ĕn nā-sē'ra), Palestine, a city noted for being the home of Jesus Christ. It is about 20 miles in direct line from the Mediterranean Sea, 15 miles from the Sea of Galilee, and 70 miles north of Bethlehem (q.v.). The distance to Bethlehem by the usual route is 110 miles. The city is built in the form of an amphitheatre, in a valley which is 1,115 feet above the level of the sea, and surrounded by hills. On the south is the plain on which the Nazarenes threshed their wheat, and farther away is the plain of Esdraelon. From the summit of the hills which surround the city a fine view of the surrounding country may be obtained.

The Nazareth of the time of Jesus extended farther up toward the summit of the hills (Luke iv.). The place was the home of Mary, the mother of Jesus, and of Joseph, the husband of Mary. The city is not mentioned in the Old Testament; but it is referred to several times in the New Testament (Luke i. 26; John i. 46, and other places). The streets are narrow, but well paved, the houses are principally of stone. The house in which Jesus lived was held in esteem in the early ages of Christianity, but when the place came into possession of the Moslems, Christians who approached the village were in great danger. At the time of the crusades (q.v.) the place was ornamented and kept in good order, but again in 1291 the Moslems gained possession and the village declined. The Franciscan Fathers erected a church and monastery in Nazareth in 1300, but they were expelled in 1362. They returned in 1468, but were obliged to leave in 1542, and returned in 1620. They are now in Nazareth and under their auspices the Church of the Annunciation, and several other churches and chapels have been built. The Fathers give hospitality to all travelers who visit the place. The pilgrim house is called "Our Lady of America," as it was erected by the contributions of Roman Catholic Americans. The house in which the Holy Family lived is said to be now in Loretto (q.v.), in Italy. Some of the points of interest are the Church of the Annunciation, the fountain of the Virgin, the workshop of Saint Joseph, the church of the schismatic Greeks, church of the United Greeks, and the *mensa Christa* (table of Christ). Tradition relates of the last mentioned, that it is the rock upon which Jesus Christ took a repast with his disciples. Saint Francis of Assisi visited Nazareth in 1219; and Saint Louis, king of France, and his wife, visited it on 25 May 1251. The Franciscan Fathers have a school for boys, and the Ladies of Nazareth a school for girls. There is one hospital in charge of Brothers of Saint John of God, a school for boys under the Brothers of the Christian Schools, and a free dispensary and home for the aged in charge of Sisters. The population is estimated to be about 10,000; in 1897, by accurate report there were 2,400 Roman Catholics (including three rites), 2,000 schismatic Greeks, 100 Protestants, and 1,500 Moslems. Consult: De Hamme (translated by Rotthier) 'Ancient and Modern Palestine'; De Vogue, 'Les Eglises de la Terre-Sainte'; Roger, 'La Terre-Sainte'; De Hamme, 'Guide-Indicateur des Sanctuaires et Lieux historiques de la Terre-Sainte'; Stanley, 'Sinai and Palestine'; Smith, 'Historical Geography of the Holy Land'; Guerin, 'Galilee.'

Nazareth, Ky., in Nelson County; on the Louisville & Nashville railroad; two and one half miles from Bardstown (q.v.) and 39 miles south by east of Louisville. It is the seat of the mother house of the Sisters of Charity in Kentucky, an order whose members follow the rule of Saint Vincent de Paul, and who extend their work through 54 branch houses in several States. The area of Nazareth is 6,000 acres, encircled by woodlands beyond which rise the famous Kentucky Knobs. One of the sisters is postmaster of the government office and the long distance telephone supplies the need of quick means of communication with patrons. The convent building has a frontage of 1,000 feet, and is surrounded by well-kept lawns, adorned with shrubs and flowers, and a park of 100 acres. It has an art gallery which contains some valuable works of the great masters and some creditable work from the teachers and students. Two fine groups of bronze, life size, are near the entrance. The library contains about 6,000 volumes and is well furnished. The laboratory is supplied with up-to-date philosophical and chemical apparatus. The museum, a hall 80 by 75 feet, contains collections of historical souvenirs, shells, fossils, corals, minerals, stuffed birds and animals, botanical specimens, herbaria, fungi, and more than 100 specimens of wood from native trees, so arranged and classified as to show the bark and the grain of the wood. The exhibition hall, 165 by 75 feet, has a seating capacity of 2,500. The church, French Gothic, a gem of beauty, is gracefully arched, handsomely furnished, and perfect in all its appointments.

The founders of Nazareth were Right Rev. J. B. M. David of Bardstown and Catherine Spalding. Mother Catherine Spalding's mother was an elder; thus the first superior was a representative of two of the most prominent families of Kentucky. The convent was founded in 1812; the school in 1814; branch houses were established in Bardstown in 1818, and at Saint Vincent's, Union County, Ky., in 1820. Under the title, "Nazareth Literary and Benevolent Institution," the convent was chartered by the Legislature of Kentucky in 1829. The Sisters, following their vocation, having done heroic service when opportunities presented themselves. They gave personal service and all the aid in their power during the cholera epidemic in 1832 and 1833; they served in taking care of the soldiers during the Civil War; in 1878, 12 sisters died at their post attending to yellow fever patients, but their places were soon filled, for when volunteers were called for, every Sister offered herself. They have done work in Louisville during various visitations of smallpox and other contagious diseases. Out of the cholera of 1833 grew their first orphan asylum, Saint Vincent's, in Louisville.

Some of the most distinguished men of the country have been their patrons: Henry Clay, who sent his daughter, granddaughter and great-granddaughter to Nazareth; Judge Benjamin Winchester, John J. Crittenden, Judge John Rowan, Zachary Taylor, Jefferson Davis, George D. Prentice, Governor Charles Wickliffe, and many others. Some of the noted pupils of the school were Sarah Knox Taylor, daughter of President Zachary Taylor; Mary Anderson, Mrs. Charlotte McIlvain Moore, Mrs. James Meline, Mary Irwin, and a host of others. The Sisters now number 820; they have houses in Kentucky, Tennessee, Arkansas, Mississippi, Ohio, Massachusetts, Maryland, and Virginia. They have 16 academies, 54 parish schools, six hospitals and infirmaries, five orphanages, and three homes. They have in their schools 16,300 pupils; in their hospitals 800 patients, and in their orphanages 550 children.

Nazareth, Pa., borough in Northampton County; on the Delaware, Lackawanna & Western railroad; about five miles north by west of Easton and 100 miles northeast of Harrisburg. It is near large anthracite coal fields and has considerable manufacturing. The chief industrial establishments are cigar factories, paper and hosiery mills, lumber and planing mills, carriage works, foundry, machine shops, lace factory, guitar factory, creamery, and large brick and coal yards. There is considerable trade in manufactures and coal. Pop. (1890) 1,318; (1900) 2,304; (1910) 3,978.

Naz'arite. See NAZIRITE.

Naz'arites, a sect of Christians in Hungary, numbering about 80,000. They profess to go back to the New Testament for their belief and practice; reject Sunday as a holy day of rest, though for convenience adopt it as the day of public worship, which any man of good standing in the church can hold, as they have no separated and ordained ministry. They observe Baptism and the Lord's Supper as sacraments, but refuse to take an oath or to serve in war. When a Nazarite is drawn in the conscription a substitute is provided either by his relations or the parish to which he belongs. The sect found an entrance into Hungary through two journeyman locksmiths, Denkel and Kropacsek of Szegedin in 1839; the locksmith Henesei became its Apostle and it rapidly grew from 50,000 members to its present number. The simple social life, charity and peacefulness of this sect puts them on a level with the followers of George Fox in English-speaking countries.

Nazirite, an Israelite who bound himself or herself to the service of Jehovah by a special vow, the obligations of which are stated in Numbers vi. 1–21. The word is derived from a Hebrew root meaning separation, and is sometimes translated in the Greek version of the Septuagint by a word that means sanctified or consecrated. The principal stipulations of the vow bound the Nazirite to abstinence from wine or strong drink and from the eating of grapes, and forbade him to cut or shave off the hair of his head, or to touch a dead body. The duration of this vow according to the Jewish canons could not be less than 30 days; though some took the vow for life. Samson, Samuel and John Baptist are mentioned in Scripture as perpetual Nazirites, of which there were two classes, those who were permitted to diminish their hair when it became too heavy, if they were willing to bring the three appointed sacrifices (Num. vi. 10–12); and those who were forbidden to diminish their hair, but could touch a dead body, as Samson did the jaw-bone of an ass, without being defiled.

The institution of Naziritism was intended to typify the separation and restraint of a holy life. The growth of the hair indicated the virility of heroic virtue; the flowing locks symbolized childlike simplicity, power, beauty, liberty and the unchecked employment of human faculties in the service of God. Maimonides speaks of the dignity of the Nazirites as being equal to that of the high-priest; according to Eusebius the historian (Hist. Eccles. ii. 23), Nazirites were the only Israelites, excepting the high-priests, who were permited to enter the Holy of Holies, Parents could dedicate their prospective children to the life of a Nazirite. No community life or separation from the engagements and enjoyments of domestic or social life was entailed by the vow, whose special object appears to have been to set forth symbolically among the people, in the person of separated devotees, useful and impressive lessons of submission to the law of holiness. Consult: Michaelis, 'Law of Moses'; Bähr, 'Symbolik des Mosaici Cultus'; Driver, 'The Books of Joel and Amos' (in the Cambridge Bible for Schools and Colleges 1897).

Neæra, nẹ-ē'rā, in Greek mythology, a name given to various nymphs; also a maiden mentioned by Horace.

Neagh, nā (local, nā'äH), **Lough**, Ireland, in the province of Ulster, is the largest lake of the United Kingdom. It is situated about 12 miles west of Belfast, is 48 feet above sea-level, 16 miles long, has an average breadth of ten miles, a maximum depth of 102 feet, and an area of 98,255 acres. It is well stocked with trout, char, pullen, and other lake fish. It receives the waters of the Upper Ban, Blackwater, and Callan, and is drained into the North Channel by the Lower Bann. The Lough is connected by canals with Belfast, Newry, and the Tyrone coal field.

Neagle, nā'gl, **John**, American painter: b. Boston, Mass., 4 Nov. 1796; d. 1865. He was practically a self-taught artist although after his marriage with the daughter of Thomas Sully he received instruction and encouragement from that painter, and applying himself to portrait painting he rapidly grew in favor wth connoisseurs and was made director of the Pennsylvania Academy (1830), and in 1835 first president of the Artists' Fund Society of Philadelphia. Many of his most important works are at Philadelphia, where his parents had settled shortly after his birth. The full-length of 'Patrick Lyon at the Forge' (1826); and the portraits of Rev. Joseph Pilmore, Henry Clay, and George Washington are strong in drawing, harmonious in coloring and strikingly characteristic.

Neal, nēl, **Daniel**, English non-conformist clergyman and historian of the Puritans: b. London 14 Dec. 1678; d. Bath 4 April 1743. He studied at the Merchant Taylors' School, at a Dissenters' theological school in Little Britain, in Utrecht for two years and in Leyden for one; was assistant and then pastor of a congregation which met first in Aldersgate Street and later in Jewin Street; and wrote 'History of New England' (1720), which won him the honorary degree of M.A. from Harvard, and the great 'History of the Puritans' begun by John Evans but practically the work throughout of Neal (1732–8). The latter book won him a high reputation with the non-conformists, but is not free from bias. It brings the history of English Dissent down to 1689. Consult the 'Life of Neal' by Toulmin (1793).

Neal, David Dalhoff, American painter: b. Lowell, Mass., 20 Oct. 1838. He began his studies at the Munich Royal Academy, where he gained the Great Medal. He has painted many historical-romantic pictures and among them 'Mary Stuart and Riccio'; 'Oliver Cromwell Visits John Milton'; 'Nuns at Prayer'; 'In the Crypt'; 'Retour du Chasse'; etc. Among his portraits may be mentioned those of Adolph Sutro; Rev. Mark Hopkins; Judge Hoffman of California; D. O. Mills; Whitelaw Reid; etc.

Neal, John, American author: b. Portland, Maine, 25 Aug. 1793; d. there 21 June 1876. He had little schooling; was a clerk in Boston; removed to Baltimore in 1816, began to practise law and write fiction. He contributed largely to British periodicals, lived in England 1823–7, being secretary to Bentham part of that time, and was the first successful American author abroad. He was (1838) one of the earliest speakers in behalf of woman's suffrage, was attracted successively by phrenology, mesmerism, and spiritualism, and probably introduced gymnastics into America. Neal was the patron and guide of several younger writers, notably Edgar Allan Poe. Under the name Jehu O'Cataract he wrote a bombastic poem 'Battle of Niagara' (1818). His novels include 'Randolph' (1823), in which he drew the portrait of William Pinckney so freely as to rouse Edward C. Pinckney to challenge the author; 'Brother Jonathan' (1825); and 'Rachel Dyer' (1828). He wrote the most of 'Paul Allen's American Revolution,' and much else with "marvelous rapidity." Consult his 'Wandering Recollections of a Somewhat Busy Life' (1869).

Neal, Joseph Clay, American journalist: b. Greenland, N. H., 3 Feb. 1803; d. Philadelphia, Pa., 18 July 1847. He edited the 'Pennsylvanian' in 1831–44 and later established the 'Saturday Gazette.' He wrote: 'Charcoal Sketches' (1837); 'Peter Ploddy and other Oddities' (1844); etc.

Neale, Edward Vansittart, English reformer: b. Bath, England, 1810; d. 1892. He was educated at Oxford, and became a Christian Socialist. He founded the first co-operative store in London and was instrumental in the establishment of numerous co-operative societies, mills, etc.; and visited America in 1875 in the interests of his work. He published: 'The Characteristic Features of Some of the Principal Systems of Socialism' (1851); 'The Mythical Element in Christianity' (1873); etc.

Neale, John Mason, English clergyman and hymn-writer: b. London 24 Jan. 1818; d. East Grinstead, Sussex. He was graduated from Trinity College, Cambridge, in 1840; became fellow and tutor of Downing College in that year; and from 1846 until his death was warden of Sackville College, East Grinstead. His ecclesiastical views were those of the most advanced wing of the High Church party. In 1839 he was a founder of the Cambridge Camden Society, later the Ecclesiological Society, and in 1854 established at Rotherfield the sisterhood of St. Margaret, transferred in 1856 to East Grinstead. In rebuilding Sackville College chapel in 1850 he added ornaments denounced by Gilbert, bishop of Chichester, who inhibited him from officiating in the diocese, but the inhibition was removed in 1863. Neale is said to have known 20 languages. His greatest work was in hymnology. As a translator of Latin and Greek Christian hymns he has perhaps never been equaled. Fully one eighth of 'Hymns Ancient and Modern' (1878) is by him. Chief among his renderings are 'Mediæval Hymns and Sequences' (1851); 'The Rhythm of Bernard of Morlaix' (1858), and 'Hymns of the Eastern Church' (1863). From the 'Rhythm' have been adapted the familiar 'The World is Very Evil,' 'Brief Life is here our Portion,' 'For thee, O dear, dear Country,' and 'Jerusalem the Golden.' He wrote also an important 'History of the Holy Eastern Church' (1847–51). In 1884 a selection from his writings was published. Consult: Julian, 'Dictionary of Hymnology,' pp. 785–90 (1892).

Neander, Johann August Wilhelm, yō'hän ow'goost vĭl'hĕlm nā-ăn'dĕr, German theologian and church historian: b. Göttingen 17 Jan. 1789; d. Berlin 14 July 1850. A Jew, his name was originally David Mendel. Upon his profession of Christianity in 1806 he assumed the name Neander ("new man"). After study of theology at Göttingen, he became professor at Heidelberg in 1812, and in 1813 at Berlin. At Berlin he lectured until his death, largely on church history, but also on ethics, New Testament exegesis, and systematic theology. His lectures were notable, and his literary activity great. He was the founder of modern church history, and beyond doubt the chief in that field in the 19th century. His motto, "Pectus est quod theologum facit," illustrates his method. He viewed Christianity, not, like either Supernaturalists or Rationalists, as a scheme of doctrine, but as a divine force; and its history as the study of human history in terms of that force. His principal work is the 'General History of the Christian Religion and Church' ('Allgemeine Geschichte der christlichen Religion and Kirche') (1825–52), translated by Joseph Torrey (12th ed. 1881), and more widely circulated in England and the United States than in Germany. This survey is based on a most careful use of the sources, and is marked by rigorous analysis. Neander's style here, as elsewhere, is somewhat involved at times, but free from pretentiousness. Schaff terms Neander "a giant in learning and a saint in piety." He wrote further 'Julian the Apostate' (1812; Eng. trans. 1850); 'St. Bernard' (1813); 'Memorials of the Christian Life in the Early and Middle Ages' (1822; Eng. trans. by Ryland 1852); 'History of the Planting and Training of the Christian Church' (1832; Eng. trans. by Ryland 1842); 'The Life of Jesus Christ' (1837; Eng. trans. by McClintock and Blumenthal 1848); and other works. Consult: Schaff, 'St. Augustin, Melanchthon, and Neander' (1886); Wiegand, 'Life' (1890).

Neanderthal, Prussia, a valley or ravine near the village of Hochdal, between Düsseldorf and Elberfeld, which came into prominence in 1857 by the discovery in a limestone cave at a depth of 60 feet, of the remains of a prehistoric man, of a hitherto unknown type. The peculiar dolichocephalic formation of the skull induced several anthropologists to regard it as typical of a separate race of cave dwellers, while others explained the abnormality as caused by disease during the lifetime of the individual; it is now regarded as a representative of the most ancient of European dolichocephalous people, of whom various remains have been found subsequently in Bohemia, France, and England.

Neap-tides are those which happen when the moon is nearly at the second and fourth quarters. The neap-tides are low tides in respect to their opposites, the spring-tides. See TIDES.

Neapolis, nẹ-ăp'ō-lĭs, Macedonia, the town where Saint Paul, as mentioned Acts xvi. 9–11, commenced his evangelizing work in Europe. It was the port of Philippi eight miles to the west, and was situated on Kavala Bay, near the site of modern Kavala in Turkey.

Nearchus, nẹ-är'kŭs, officer of Alexander the Great. He was a native of Crete and went to Amphipolis in the reign of Philip at whose court he formed a friendship with Alexander. Under the latter he was made governor of Lycia and other provinces in Asia Minor in 330 B.C. and about 329 B.C. accompanied Alexander in the Indian campaigns. In 326–5 he commanded the great fleet built by Alexander at Hydaspes and conducted it from the Indus to the Persian Gulf, discovering on his way the mouths of the Euphrates and the Tigris. Upon the division of the empire which followed Alexander's death, Nearchus was made governor of Lycia and Pamphilia by Antigonus. He wrote an account of his voyage, which has been preserved in Arrian's ‘Indica.’ See Plutarch, ‘Vita Alexandri’; Vincent, ‘Voyage of Nearchus to the Euphrates.’

Nearc'tic Region, one of the primary faunistic divisions of the Earth (see ZOOGEOGRAPHY) according to the widely accepted scheme of Sclater and Wallace. It embraces all North America, as far south as the highlands of Mexico carry northern climatic conditions. The differences between its fauna and that of the northern parts of the Old World (Palæarctic Province) are, however, not sufficient, in the view of many students, to justify so primal a distinction; and the later tendency is toward uniting the Nearctic and Palæarctic "regions" into one under the name Holarctic region, or Arctogæa.

Nearsightedness. See SIGHT, DEFECTS OF.

Neat's-foot Oil, an oil obtained from the feet of the common ox.

Nebo, nē'bō, Palestine, the biblical name of Jebel Neba, 2,643 feet high, a few miles east of the north end of the Dead Sea, the mountain of ancient Moab whence Moses viewed the Promised Land, and where he died (Deut. xxxii. 49; xxxiv. 1).

Nebo, or **Nabu,** in Babylonian mythology, an idol representing the planet Mercury. It was worshipped by the ancient Arabians, and among the Chaldæans and Assyrians from the fact that many compound proper names occur in the Scriptures of which this word forms a part; as, Nebuchadnezzar, Nebuzaradan, Nebushaszan, etc.

Nebraska, nē-brăs'ka (the "Tree Planter State" (admitted to the Union 1 March 1867), is bounded on the north by South Dakota, on the west by Colorado and Wyoming, on the south by Colorado and Kansas, on the east by Iowa, from which it is separated by the Missouri River. Capital, Lincoln; area, 76,840 square miles; population (1910) 1,192,214.

Topography.— The surface of Nebraska is a part of the great plain which slopes from the Rocky Mountains to the Missouri River. This slope is gradual but almost rapid. The western part of the State is called the foot-hill region, being the extreme extension of the Rocky Mountain uplift. Its eastern elevation is from 3,600 to 4,000 feet, and its western about 5,000 feet. North of the North Platte River a low mountain chain — Pine Ridge — extends east and west about 100 miles, some of its precipitous hills or peaks, of fantastic shapes, reaching a height of 4,500 feet. The part of the Bad Lands in Nebraska is included in this region. The surface slopes from Pine Ridge southward to the North Platte River. There is another chain of low mountain south of the North Platte River, called the Wild Cat Mountains, and in this range Wild Cat Mountain, in Banner County, rises to a height of 5,038 feet, the highest elevation in the State; and Gabe Rock and Big Horn Mountain, in the same county, are respectively 5,006 and 4,718 feet in height. East of the northern foot-hills are the Box Butte plains, with a gently undulating surface, about 500 square miles in area and 4,000 feet in elevation. The surface slopes gradually from north to south also. Thus the altitude at Benkelman, in the extreme southwest, is 2,968 feet; of the extreme southeast, at Rulo, 842 feet; of the extreme northwest, at Harrison, 4,849 feet; of the extreme northeast, at Dakota City, 1,102 feet. The altitude of Kimball, in the southwest part of the western projection of the State and about 100 miles south of Harrison, is 4,697 feet. The uniformity of the slope of the Platte Valley is remarkable. The altitude of Plattsmouth, at the mouth of the Platte River, is 968 feet; of Kearney, in the Platte River Valley, about midway across the State, 2,152 feet; and of Ogallala, near the western border and also in the Platte Valley, 3,211 feet — the difference between Plattsmouth and Kearney being 1,184 feet, and between Kearney and Ogallala 1,159 feet.

River Systems.— The river system is simple and in an undeveloped condition. The only large river, besides the Missouri, which forms the eastern border of the State, is its tributary, the Platte, which flows through the central part from east to west. Both the north fork and the south fork of this river rise in the heart of the Rocky Mountains, the first northwest, and the other southwest of Denver. They unite at the town of North Platte, 250 miles from the east boundary of the State. The other considerable streams are the Republican, the Niobrara, and the Loup Fork rivers. The Republican rises in eastern Colorado, and flows eastward in Nebraska and near its southern line for a distance of 216 miles, then southwestwardly in Kansas, entering the Kansas River at Junction City, Kan. The Niobrara River, whose entire length is about 460 miles, rises in the mountainous districts of southeastern Wyoming, and flowing eastward enters the Missouri River on the northern border of the State, 100 miles from its eastern line. Through about 200 miles of its course it flows rapidly in a deep and narrow cañon, and then in a broad and sandy channel, characteristic of the other principal rivers of Nebraska. The main branch of the Loup Fork rises in the northwest part of the State, and flowing southeastwardly enters the Platte River at Columbus, 75 miles west of the eastern boundary of the State. Notable features of the river system are that the principal streams run nearly parallel to one another, and are almost uniformly shallow, with low banks. In general, the surface of the land slopes away from the Platte River on the south, so that, regarded from that side, its bed is really a ridge rather than a valley. For example, the altitude of the southerly part of Franklin County is 1,845 feet, while that of the river, only 40 miles north, is about 2,150 feet. The sources of the Platte River are mountain streams fed by the snows of the Rocky Mountains. An inexhaustible bed of water underlies the surface of the whole State, and it percolates rapidly through the loose formation, so that wells yield a remarkably large flow. This subterranean sheet of water is fed partly by seepage from the Platte and other principal streams, but mainly by the rainfall, 90 per cent of which is absorbed by the porous soil; while in the States east of the Missouri River 50 per cent of the rainfall commonly flows over the surface, and is either evaporated or finds it way to the sea. While there are many smaller streams of water in most parts of the State, tributary to the principal streams, yet these are not as numerous as in the more easterly States; but, on the other hand, in Nebraska, an unlimited supply of water, which is easily reached through the loose soil and drawn to the surface by windmills, underlies every farm; and in fact the States of the trans-Missouri plains have the best distributed water supply for ordinary purposes in the country.

Artesian Wells.— Artesian wells, most of them with a strong flow of water, are found in 35 counties, distributed throughout all parts of the State. They may be classed in four natural groups: the deep wells of the Carboniferous, located at Beatrice, Lincoln, and Omaha, and of a depth varying from 556 to 2,463 feet; those of the northeastern counties in the Dakota sandstone, 300 to 600 feet deep, a continuation of the great South Dakota basin, where the water flows with great force from below the Pierre shale when it is pierced; the shallow wells in glacial clays and sands, such as those at Cook; and other shallow wells not in the drift, as in Holt and Rock counties. The water from the artesian wells at Beatrice and Lincoln are very strongly impregnated with common salt, and at the latter place they are extensively used for bathing and medicinal purposes.

Climate and Rainfall.— The atmosphere of Nebraska is characterized by dryness and rarity, though these qualities are not extreme. This feature, together with the generally cloudless sky, makes the climate through most of the year exhilarating and very enjoyable. In the months of July, August, and September, the sun is very hot, and at times the south wind is oppressive; but this is the only disagreeable feature of the climate. The winters, in particular, are dry, and in general mild with prevailing brilliant sunshine. The highest average temperature of 52° F. is found in the extreme southeast part of the State at an elevation of about 900 feet; it is 2° less in the southwest part at an elevation of 3,000 feet. The mean annual temperature decreases toward the north at an average rate of 1° to each 40 miles in the eastern and southern parts, but in the northwest the decrease is less rapid. Along the northern boundary the average temperature is about 46°. January is the coldest month, with a mean temperature of about 27° below the yearly average. In the coldest days of winter the temperature falls to from 10° to 20° below zero, and rarely as low as 30° below zero. In the northwest part of the State, 40° below zero has been recorded twice in the last 28 years. July is the warmest month, with a temperature of about 26° above the yearly mean, and a range of mean temperature from 78° in the southeast to 72° in the northwest. In the hottest days of summer the temperature sometimes exceeds 100°. The last killing frost in spring occurs in the southeast during the last 10 days of April, but it appears gradually later to the northward and westward, occurring near 1 May in most of the agricultural section of the State, while in the highly elevated northwest the season is about two weeks later. Killing frosts come as a rule in the South Platte district during the first week in October, and from 5 to 10 days earlier in the central and northwestern parts of the State. The average length of the season between killing frosts is from 155 to 165 days in the southeast, from 145 to 150 in the northeast, central, and southwest, and from 130 to 135 in the northwest. The precipitation consists almost entirely of rain, the average snowfall being only about 20 inches, equal to two inches of water, or less than one tenth of the total precipitation. The precipitated moisture comes almost entirely from the Gulf of Mexico, and is brought by the prevailing southerly winds of summer. The annual precipitation slightly exceeds 30 inches in the southeastern part of the State, and decreases to the north and west somewhat irregularly but at an average rate of 1 inch from the southeast corner to the middle of the western border, where it is only 15 inches. The decrease northward along the eastern border is about 1 inch for 40 miles, or to 27 inches in the northeast corner. The decrease westward is 1 inch for each 50 miles along the northern border, or to 18 inches in the northwest corner. There is very little precipitation in the winter months, and it averages less than an inch of water for each month from November to February, inclusive. There is a slight increase in March, but the spring rains begin in April, when the fall is from 2 to 3 inches in most parts of the State. In May it is about 1 inch more, and in June and July reaches about the same amount. June is the month of heaviest rainfall, with an average of 5 inches in the southeast and slightly less than 3 inches in the southwest. There is a decided decrease in August, and still less again in September and October. The significant fact of the meteorology of Nebraska is that nearly 70 per cent of the rainfall occurs in the five crop-growing months — from April to August. This is why, with a relatively small annual rainfall, great crops of all the agricultural staples are produced.

Surface, Farming, Stock-raising, and Irrigation.— With the exception of parts of the extreme northwest counties and of what is known as the Sand Hill region, the soil of Nebraska is fertile; within the limits of sufficient rainfall it produces all crops peculiar to the latitude, and outside of that limit it produces the most nutritious grasses. Wherever in the arid region irrigation is supplied, the soil produces heavy crops. This fact is illustrated in the irrigated part of Scott's Bluff County, where the altitude is over 4,000 feet. The Bad Lands system of South Dakota reaches over into northwestern Nebraska, occupying a part of Dawes and Sioux counties. While most of the Bad Lands are worthless, yet even in them there are cañons and pockets with grass and water which make fine pasture for stock. The Sand Hill region comprises upward of 15,000 square miles, extending generally from the 98th meridian to the 102d meridian on the north border of the State. The other two boundary lines extend from the two points in question in irregular courses to the southeast and to the southwest, respectively, until they meet near the southern border of the State. The hills proper are in the northerly part of this region, and are formed of sand which drifts before the wind. They are constantly

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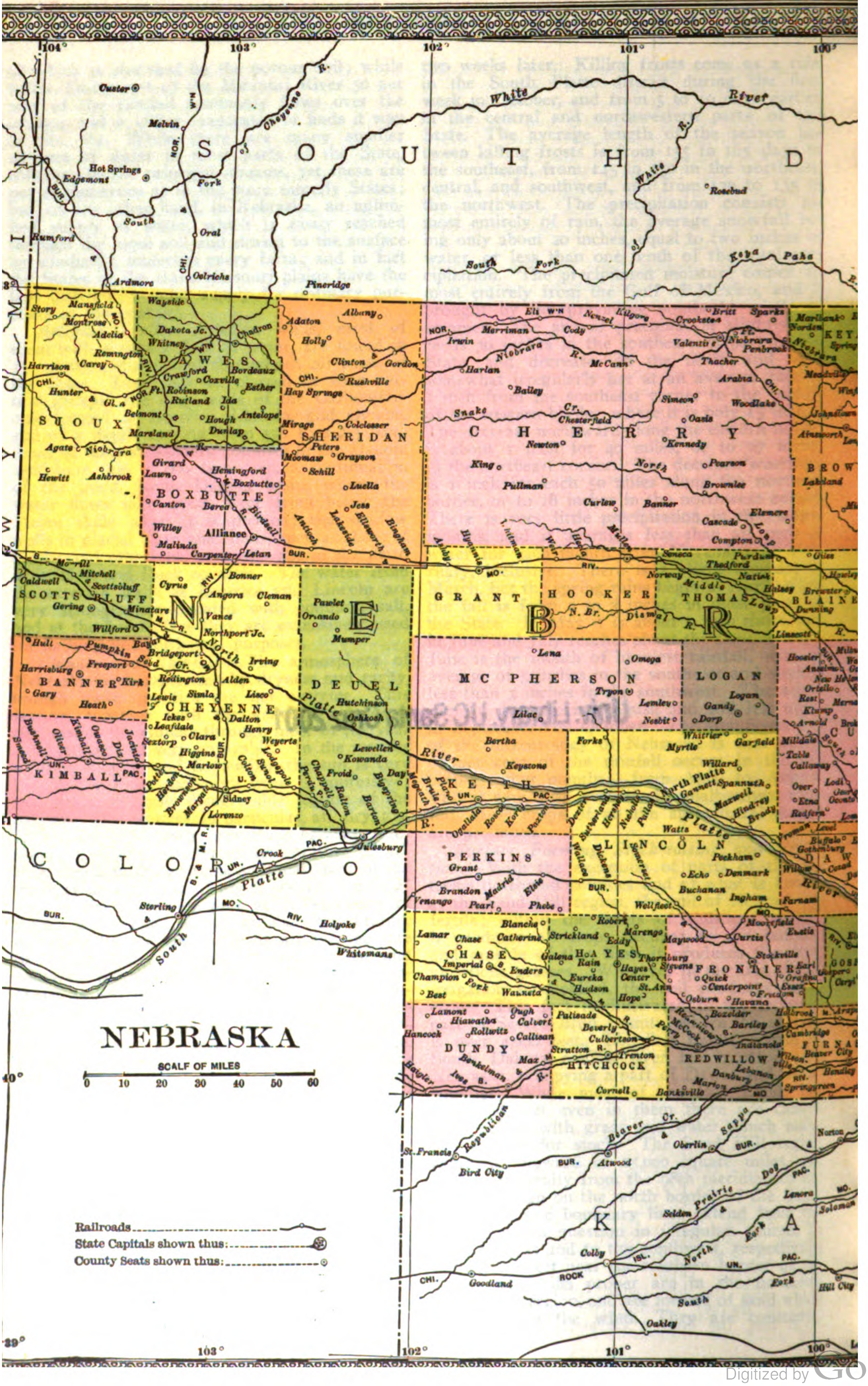
NEBRASKA
SCALE OF MILES
0 10 20 30 40 50 60
Railroads
State Capitals shown thus
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SOUTH D
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SCOTTS BLUFF
BANNER
KIMBALL
CHEYENNE
DEUEL
GRANT
HOOKER
THOMAS
BLAINE
McPHERSON
LOGAN
KEITH
LINCOLN
PERKINS
CHASE
HAYES
FRONTIER
DUNDY
HITCHCOCK
RED WILLOW
White River
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North Platte R.
South Platte
Republican
104°
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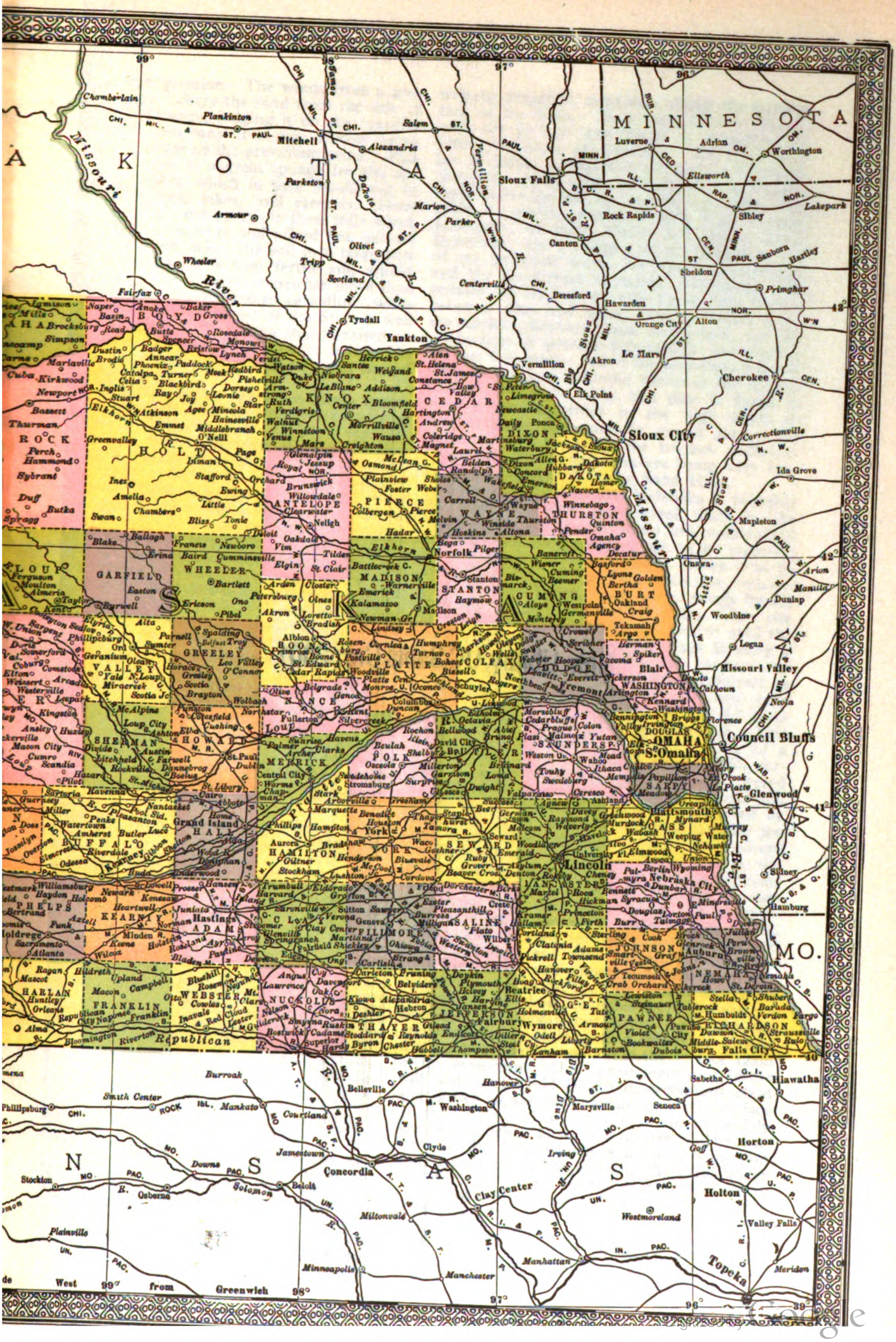
99°
98°
97°
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43°
42°
41°
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West 99° from Greenwich 98°
DAKOTA
MINNESOTA
IOWA
KANSAS
MO.
Missouri River
Chamberlain
Plankinton
Mitchell
Alexandria
Salem
Sioux Falls
Parkston
Armour
Marion
Parker
Canton
Wheeler
Olivet
Tripp
Scotland
Tyndall
Yankton
Centerville
Beresford
Vermillion
Elk Point
Akron
Luverne
Adrian
Worthington
Ellsworth
Rock Rapids
Sibley
Lakepark
Sheldon
Sanborn
Hartley
Primghar
Hawarden
Orange City
Alton
Le Mars
Cherokee
Sioux City
Correctionville
Ida Grove
Mapleton
Onawa
Arion
Manilla
Dunlap
Woodbine
Logan
Missouri Valley
Neola
Council Bluffs
Glenwood
Sidney
Hamburg
BOYD
KNOX
CEDAR
DIXON
DAKOTA
HOLT
ROCK
ANTELOPE
PIERCE
WAYNE
THURSTON
GARFIELD
WHEELER
MADISON
STANTON
CUMING
BURT
LOUP
GREELEY
VALLEY
BOONE
PLATTE
COLFAX
DODGE
WASHINGTON
SHERMAN
HOWARD
NANCE
MERRICK
POLK
BUTLER
SAUNDERS
DOUGLAS
SARPY
BUFFALO
HALL
HAMILTON
YORK
SEWARD
LANCASTER
CASS
PHELPS
KEARNEY
ADAMS
CLAY
FILLMORE
SALINE
OTOE
JOHNSON
NEMAHA
HARLAN
FRANKLIN
WEBSTER
NUCKOLLS
THAYER
JEFFERSON
GAGE
PAWNEE
RICHARDSON
O'Neill
Norfolk
Madison
Columbus
Fremont
Blair
Schuyler
Grand Island
Hastings
Kearney
York
Seward
Lincoln
OMAHA
S. Omaha
Plattsmouth
Nebraska City
Auburn
Beatrice
Fairbury
Hebron
Falls City
Tecumseh
Wymore
Crete
Wahoo
Central City
St. Paul
Republican
Platte
Elkhorn
Loup
Big Blue
Burroak
Smith Center
Phillipsburg
Mankato
Belleville
Hanover
Marysville
Seneca
Sabetha
Hiawatha
Courtland
Washington
Jamestown
Clyde
Irving
Concordia
Downs
Stockton
Osborne
Beloit
Solomon
Clay Center
Goff
Horton
Holton
Westmoreland
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changing their position. The winds from a prevailing direction carry the sand from the side of a hill, over its apex, lodging it on the opposite side, and in this way it slowly travels along the general course of the prevailing wind. This Sand Hill region is a great sponge for the absorption of water, which in turn breaks out in numerous springs, lakes, and streams. There are many pockets and valleys in these hills which are occupied by ranches and afford fine pasture and hay for stock, while the soil in a large part of the whole region is both fertile and arable. About 40,000 square miles, somewhat more than half of the State, is adapted to agriculture without irrigation, while the rest of the State is well adapted to grazing. The stock that is raised on the vast pasture lands of the western half is fattened by the abundant crops of corn and hay of the eastern part.

The irrigation system comprises canals aggregating about 2,500 miles in length and covering approximately 1,000,000 acres. Most of the running water in the arid portion of the State that is readily accessible has been utilized for irrigation purposes; but some of the streams, and notably the Niobrara River, which would cover a large area of very fertile lands, have not yet been put to use. If the system of water storage and distribution is established by the Federal government, as now contemplated, the resulting increase in the cultivable area and agricultural products of western Nebraska will be enormous.

Blue stem, grama, drop-seed, and wild wheat grass make up the common «prairie grass» which is general in the eastern third of the State. They continue also to the west, but in shorter form, and buffalo grass takes their place to a considerable extent. These grasses, and particularly the blue stem and grama, constitute the «bunch grass» of the more arid parts of the State, including the Sand Hills. The range of vegetable products is shown in the following table, compiled from careful estimates of the crops of 1910, by the Secretary of Agriculture, Washington:

	Acreage	Total yield Bushels
Winter wheat	2,100,000	34,650,000
Spring wheat	350,000	4,865,000
Corn	8,000,000	206,400,000
Oats	2,650,000	74,200,000
Rye	75,000	1,200,000
Barley	135,000	2,498,000
Potatoes	110,000	6,600,000
Buckwheat (estimated)	1,000	20,000
Millet "	135,000	335,000
Sorghum "	130,000	460,000
Alfalfa "	240,000	840,000
Timothy "	245,000	470,000
Hay	1,500,000	1,500,000
Flaxseed	10,000	80,000

	Number
Sheep	303,000
Horses and mules	1,117,000
Hogs	4,201,000
Cattle	3,949,000

A normal crop of corn produces about 250,000,000 bushels, and of wheat upward of 50,000,000 bushels. The yield of these two great staples will in time greatly exceed these amounts. Winter wheat has been found to be a reliable and prolific crop only within recent years; and it has lately been demonstrated that alfalfa will do well and yield above three tons to the acre, without irrigation, anywhere within the farming area of the State. These two facts or discoveries are of vast importance in estimating the future resources of Nebraska. The total number of farms (1909) was 129,419; total acreage, 38,553,000; total value of farm land and buildings, $1,811,557,000; of land, $1,613,077,000. The value of poultry produced each year is about $4,000,000; of milk, butter, and cheese, about $9,000,000; and of eggs, about $5,000,000. All of the principal fruits are raised successfully, and the production is rapidly increasing. The number of fruit trees was more than trebled between 1890 and 1900. The principal crops are apples, cherries, plums and grapes, but the production of peaches has rapidly increased in the last five years. All of the well-known forest trees of northern latitudes thrive in the eastern half of the State. The bull pine is found in considerable quantities in the high lands of the northwest and tends to spread out on the plains as well as along the streams eastward. Pines and other evergreens are being very successfully propagated in the Sand Hills.

Geology.— Geologically Nebraska is probably the most distinctly agricultural State in the Union; but though its rocks are undisturbed sediment and its geology is apt to be regarded as very simple, yet investigation shows it to be diversified and not without economic importance. The geological strata are so deeply buried that they are not exposed for study. They sag or dip toward the west and are hidden until the Rocky Mountains are reached, thus forming a deeply buried trough. The beds are covered by very distinct loose surface material known as bluff deposit or loess, glacial drift and sand hills. All of the southeastern half of the State is covered by loess, often 100 feet deep. This loess is a sandy loam of glacial origin, of a light yellow color and almost inexhaustible fertility. The northwestern half is largely covered by sand hills formed by the transportation and piling up of the disintegrated Tertiary rock by the wind. This sand hill covering is often 300 feet thick. The limestone of the coal measure or Carboniferous age — the oldest rock in the State — is exposed particularly along the streams in the southeastern counties. Though the carboniferous rock does not yield coal of commercial value yet its limestone produces lime, rubble, riprap, and is used for building, smelting and sugar refining; and this formation yields also flint for ballast and enormous amounts of excellent clay for brick, tile and terra-cotta. West of Lincoln, or about 40 miles from the eastern border, the carboniferous strata dip under the cretaceous rock, sinking to a depth of several thousand feet before coming to the surface again in the mountains. If its great mantle of fertile soil and sand could be lifted, cretaceous clays and shales would predominate over the surface of the State. They actually occur in widely scattered patches along the streams. The Dakota is the best known and most important layer of cretaceous rock, being the great water bearing bed. It is composed largely of rusty sands and beds of clay which appear from the south-central boundary to the northeast corner of the State. Besides producing unlimited quantities of excellent water, including the artesian flow, the Dakota layer furnishes superior clay of all colors for brick, a soft and ocherous stone which is used for building, sand for building purposes and valuable gravel beds. Overlying the Dakota is the Benton cretaceous, in the main a white layer of chalk rock overlying black shale. It is found along the Republican and Niobrara rivers. The chalk rock is very soft when quarried and is easily cut into desired shapes for building for which it is used after it has hardened by exposure to the air. This rock promises to become a valuable industrial resource in the manufacture of hydraulic cement.

The Pierre formation overlies the Benton and covers about two thirds of the State, reaching a thickness of 4,000 to 5,000 feet. It is commonly called Pierre shale and is of no commercial value. Overlying the Pierre shale are the Tertiary beds, divided into a lower clayey layer, 800 to 1,000 feet thick, known as the Bad Lands (Oligocene), and an upper layer, 500 to 600 feet thick, known as the Butte sands (Arikaree Miocene). Where the surface is not too much broken the soil of the Bad Lands is inherently fertile, but in general they are of little commercial value. They contain, however, the most important and valuable geological fossils perhaps in the whole country. Scenically they are imposing to the degree of grandeur and will eventually attract large numbers of tourists.

In many places in the southwestern part of the State a still younger formation rests upon what is known as the magnesia or mortar beds (Ogallala). All other beds are still more recent and consist of unconsolidated materials. The eastern fifth of the State has a thin layer of glacial drift under the layer of loess, and it is composed of clay, gravel, sand, boulders of granite, green-stone, and more especially sink boulders of Sioux quartzite from Sioux Falls, S. D. The youngest deposit in the State is the alluvium along the streams, chiefly valuable on account of its great fertility and because it yields brick of a fair quality where good clays are wanting. Among the mineral resources of the State, either already developed or of probable utility, are ocher, peat, bituminous coal of the carboniferous formation, lignite coal of the cretaceous, diatomaceous earth, natural pumice or volcanic ash in extensive beds, enormous amounts of clay, limestone, sand, gravel, flint and material for the manufacture of hydraulic cement. Other well known and important minerals and metals are found, but not in such quantities and conditions as to be of economic value.

Manufactures.— The total capital engaged in manufactures in 1909: $84,015,000; number of wage-earners, 29,428; salaries and wages, $19,432,000; value of products, $198,669,000. The leading manufacturing industry is slaughtering and meat-packing. The product of the eight packing establishments — situated at South Omaha — was about $75,000,000. The output of one or perhaps two packing centres — Chicago and Kansas City—equals that of South Omaha at the present time. Other leading manufactures are, flour and grist-mill products, $8,100,794; steam railway car shops, $2,624,461; printing and publishing, $2,553,051; butter, cheese and condensed meat, $2,253,893; malt liquors, $1,433,501. There are three beet sugar factories in State, located at Ames, Grand Island and Norfolk. Forty-seven counties engaged in beet-raising, the total acreage of 11,193 producing 102,858 tons, average price $5.00 per ton. The output of the three factories was 22,890,000 pounds of sugar. Nebraska soil is peculiarly adapted to beet-raising and under experienced cultivation produces an average of 15 tons to the acre. A net profit of from $25 to $35 an acre is commonly realized by the beet grower. The area adapted to beet-raising is so great and the soil so rich that the beet sugar industry, which is still in its infancy in the State, promises to grow to great proportions.

Railroads.— Considering the comparative newness of the State, Nebraska has a remarkably well developed railroad system, consisting of 5,757.92 miles. Four trunk lines traverse the State from east to west—the Chicago & Northwestern system on the north; the Union Pacific through the central part along the Platte river; and the Burlington & Missouri and the Chicago, Rock Island & Pacific through the South Platte section. The Chicago, St. Paul, Minneapolis & Omaha railroad—allied with the Chicago & Northwestern—runs along the eastern border of the State from Omaha to the north line, and the Missouri Pacific runs from Omaha southward along the eastern border with several branch lines into the interior of the South Platte section. Ramifications of the main lines cover the eastern half of the State like a net work, and all parts are well supplied with railway facilities. The principal railway centres are Lincoln and Omaha.

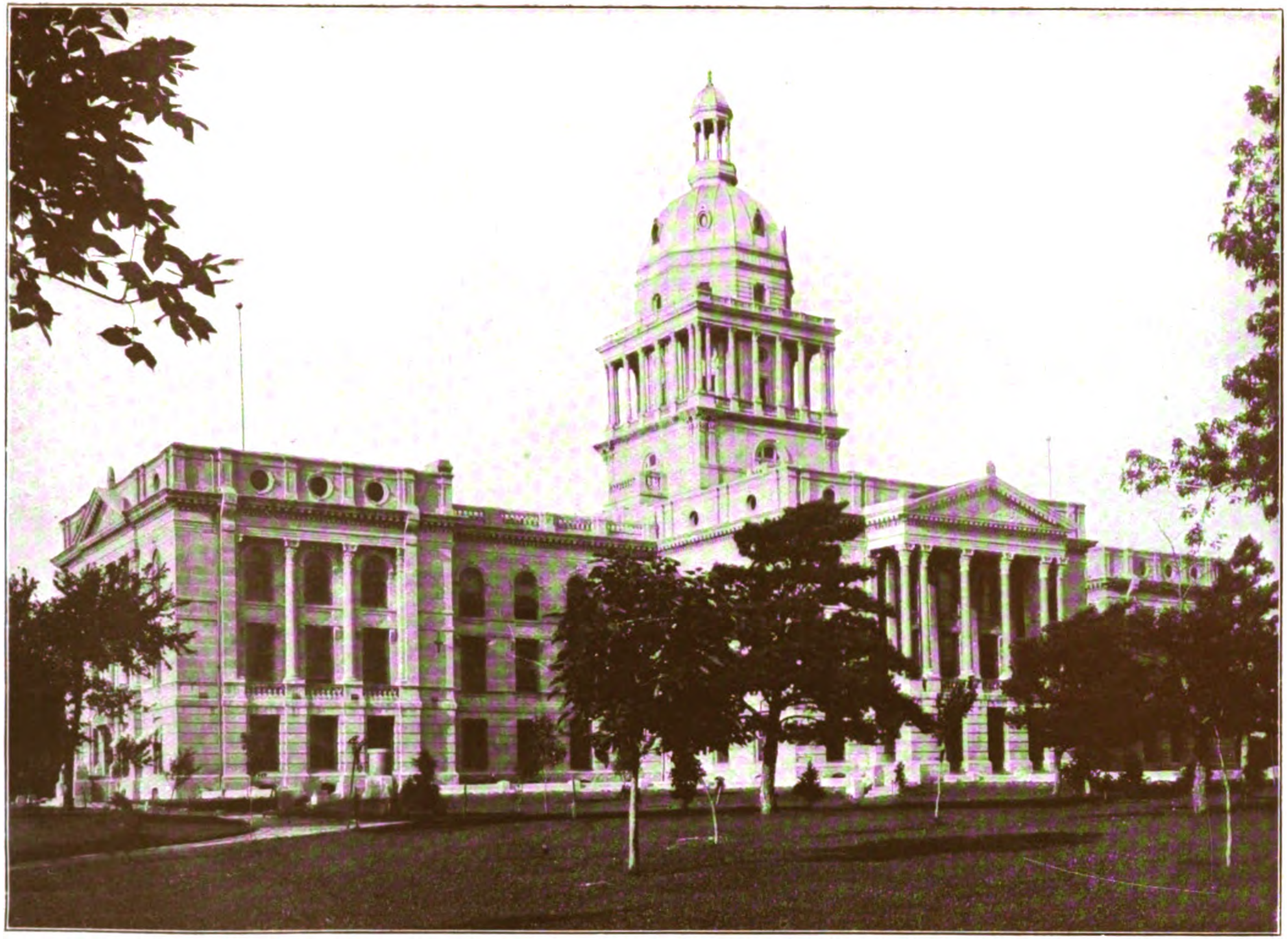
The mileage of the several railway systems is about as follows:

Burlington & Missouri	2,409.69
Union Pacific	947.40
Chicago, Rock Island & Pacific	245.58
Chicago & Northwestern	1,070.08
Missouri Pacific	356.34
Chicago, St. Paul, Minneapolis & Omaha	271.16
Kansas City & Omaha	193.08
Wilmuth & Sioux Falls	129.16
St. Joe & Grand Island	112.83
Kansas City, Wyandotte & Northwestern	20.10
Atchison, Topeka & Sante Fe	2.50
	5,757.92

Finances.—The total assessed valuation for 1910 (20 per cent of actual value) was $412,138,607; of real property, $261,936,073; of personal property, $150,202,534. Revenues for the biennium ending 30 Nov. 1910 were $11,345,356.58; expenditures, $10,744,066.34. There is no bonded indebtedness. A large expenditure went to education. There was an unexpended balance on hand 30 Nov. 1910 of $601,200.24.

Banks.—On 30 June 1909 there were 194 national banks, having 26,348 depositors and $10,658,208.57 savings deposits; 520 State banks with 24,479 depositors and $10,900,758.50 savings deposits; 11 savings banks with 16,846 depositors and $2,618,239.87 savings deposits; and 6 private banks. No loan and trust companies were reported.

Education.—Devotion to the cause of popular education and an efficient system of schools characterize Nebraska as all of the prairie States. The percentage of illiteracy is 2.3—lower than that of any other State except Iowa, which is the same, Kansas being next lowest. The following are data for the school year 1908: Estimated number of children in the State, 5 to 18 years of age, 321,833; number of pupils enrolled, 280,581; average daily attendance, 191,152. The average duration of school, in days, was 173.6, which is a high average for the



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various States of the Union. The number of male teachers was 1,242; female teachers, 9,113; total, 10,355. The salaries of superintendents and teachers was $4,004,622; the total expenditure for this branch of the State's educational system being $6,228,554. Nebraska had in 1909 376 public high schools, 15 private secondary schools, 2 public normal schools, 3 private normal schools, 9 universities, colleges, and technological schools, and 13 professional schools. There were no colleges or seminaries for women exclusively. The institutions of higher education of collegiate rank in 1909 had 334 male professors and instructors, 114 female professors and instructors, and students as follows: Preparatory (male) 755; (female) 694; collegiate (male) 2,090; (female) 1,799; resident graduates (male) 94; (female) 63. The total receipts, exclusive of private benefactions and public appropriations for endowment, in 1909, were $922,915. In the professional schools medicine takes the largest number of students (374), and law next (279). The State University, located at Lincoln—the principal higher educational institution—had a total attendance for 1910 of 3,992 students; total number of instructors, 275; number of volumes in the library, 90,500; total income, including tuition or incidental charges, $715,000. The income of the University is about as follows:

From one mill state tax	$188,000
Annual interest on land leases, land sale contracts and investments of permanent endowment fund	50,000
Annual cash appropriations by the United States	40,000
Annual receipts from fees and all other sources	42,500
	$320,500

Under the increased valuation of property by the act of the legislature of 1903, as was expected, the income of the university from the one mill tax was nearly doubled. The State university and the agricultural college are united or fused under one general management. The former received a land endowment from the general government of 45,426.08 acres and the latter 89,148.60 acres. Of these lands 43,250 acres have been deeded to purchasers, 64,250 acres are under contract of sale and 27,000 acres are under lease contract. By act of the legislature the leased lands, that is, all those remaining unsold, are withdrawn from sale. The agricultural college has a finely developed farm of 320 acres contiguous to the city of Lincoln; the campus on which most of the fifteen buildings are situated is in the heart of the city. The value of the farm, campus, buildings and equipment of the university is approximately $1,250,000. The permanent common school securities aggregate $5,072,223.79; permanent university securities, $101,050.97; agricultural college securities, $224,692.14. The total number of acres of lands acquired by the common schools was 2,795,532.65, of which 541,460.06 acres have been deeded, 340,527.23 acres are under contract for sale, 1,909,138.02 acres are under lease contract, 1,339 acres are vacant, and 3,067.84 acres are unclassified. The total interest-bearing value of the permanent school and university funds is $9,746,451.75; and it is estimated that the present value of the remaining lands under sale and lease contracts would swell this fund to $18,000,000. The State school tax must not be less than one half of one per cent nor more than one and a half per cent on the assessed valuation.

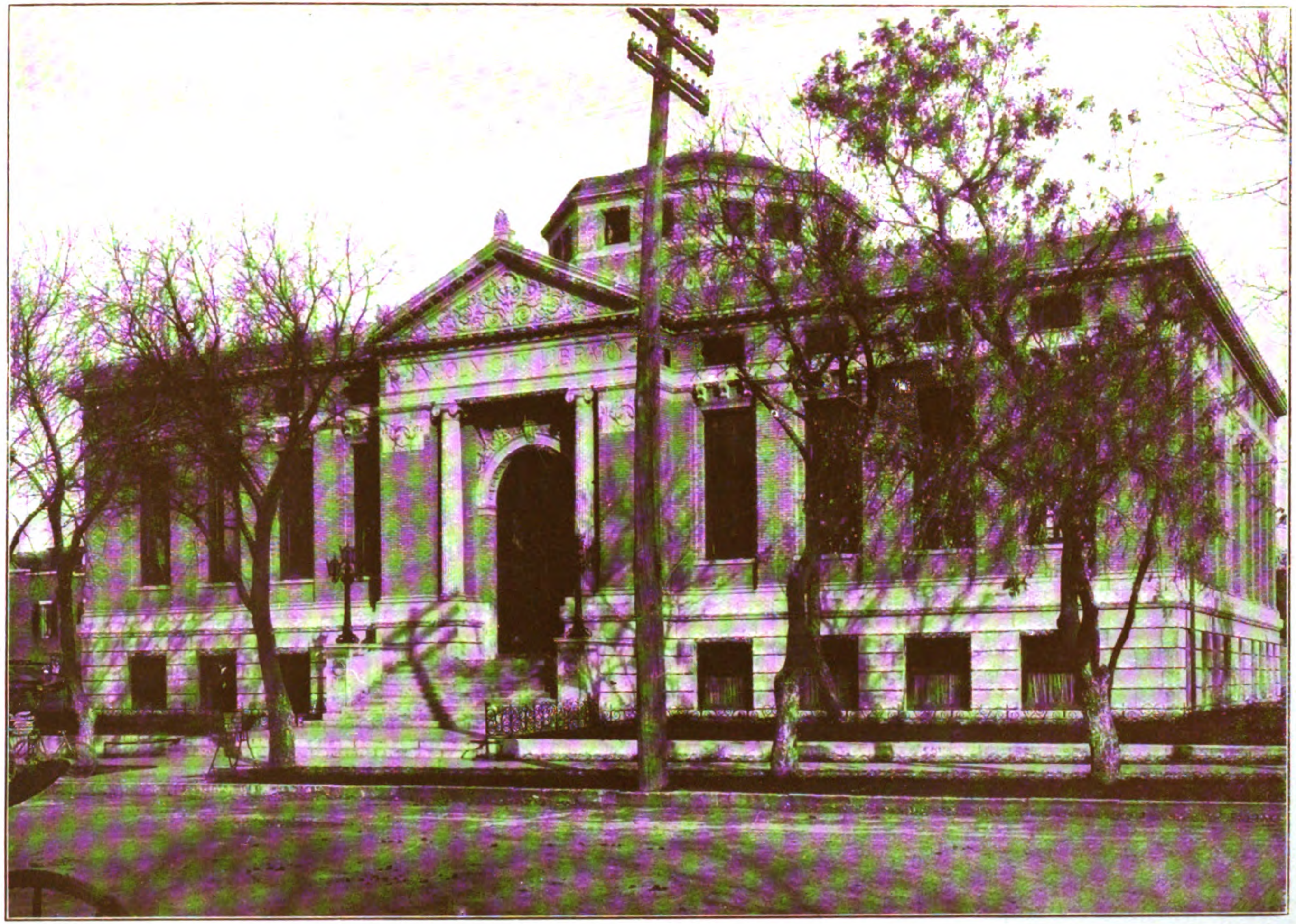
There is one State normal and training school, situated at Peru, in which about 600 students are enrolled and a second located at Kearney, was provided for by the legislature of 1903. There are about 30 private seminaries, academies and colleges, and about 20 denominational private primary schools. The following give the usual college degrees: Bellevue College (Presbyterian), Bellevue; Cotner University, under the auspices of the Christian Church, at Lincoln; Union College (Seventh Day Adventist), Lincoln; Doane College, Crete (Congregational); Fremont Normal College, Fremont; Grand Island College (Baptist), Grand Island; Hastings College (Presbyterian), Hastings; Creighton University (Roman Catholic), Omaha; Nebraska Wesleyan University (Methodist), Lincoln; Nebraska Normal College, Wayne; York College (United Brethren), York. All of the Christian denominations and the Jewish denomination have organizations in the State. The total number of church edifices is about 3,000; of communicants, 300,000; of ministers, 3,000. The Roman Catholic denomination leads with 90,515 communicants, then the Methodist Episcopal, with 53,810; the Lutheran, 34,577; the Disciples of Christ, 19,560; Presbyterian, 17,650; Baptist, 16,500; Congregational, 14,601.

Charities.— The charitable and penal institutions are as follows: Nebraska Hospital for the Insane, at Lincoln; Asylum for the Incurable Insane at Hastings; Nebraska Soldiers and Sailors' Home at Grand Island; Soldiers and Sailors' Home, Milford; Home for the Friendless (children), Lincoln; State Industrial School (for boys) at Kearney; Girls Industrial School at Geneva; Nebraska Industrial Home (for women) at Milford; Nebraska Institution for Feeble Minded Youth at Beatrice; Institute for the Deaf and Dumb, at Omaha; Institute for the Blind at Nebraska City; State Penitentiary at Lincoln. The governor, commissioner of public lands and buildings and the state superintendent of public instruction constitute the State Board of Charities and Corrections. This board appoints four advisory secretaries, not more than two of whom shall belong to the same political party; and the board and these secretaries serve without compensation. The board appoints a chief clerk and determines his compensation. The officers and other employees of these institutions are appointed by the governor and so are subject to partisan selection and change with each State administration with the inevitable pernicious results. The approximate number in poor-houses is about 850, and 400 received partial outside relief. There are on the average about 300 prisoners in the State penitentiary, of whom 5 are women. The labor of 200 is leased to contractors within the penitentiary yards at 50 cents a day.

State Government.— In 1875 the present constitution of the State succeeded that adopted at the time of its admission. The legislature consists of a Senate of 33 members and a House of 100 members — the maximum number allowed by the constitution. Its sessions are biennial and the pay of members for each session is limited to 60 days. Members of both houses are elected for two years. The executive department consists of governor, lieutenant-governor, secretary of state, auditor of public accounts, treasurer, superintendent of public instruction, attorney general and commissioner of public lands and buildings, who hold office for two years. There are three judges of the supreme court who hold their office for the term of six years. Owing to the practical difficulty of amending the State constitution other de facto officers have been provided for indirectly by creating various boards who are nominally assistants of the regular state officers. Thus there are at present nine supreme court commissioners who perform the same duties as the regular judges except that they have no power to enter judgments. There was formerly a board of railway commissioners created on the same plan, but it was abolished on the ground of uselessness by the legislature in 1901. There are 15 judicial districts which require 27 judges whose term of office is four years; and a county judge for each county whose term of office is two years. The governor, auditor and treasurer each receive a salary of $2,500 a year, and the secretary of state, attorney general, superintendent of public instruction and commissioner of public lands and buildings, $2,000. The lieutenant governor receives twice the compensation of a senator; and members of both houses of the legislature receive $5.00 a day during the session. Judges of the supreme and district courts each receive a salary of $2,500 a year. These salaries are fixed by the constitution. The several counties may adopt the township system, under which the county board of supervisors is composed of the supervisors from the several townships and municipalities, or the county commissioner system. Under the latter there are three commissioners in counties with not more than 125,000 inhabitants, and five commissioners in all other counties; but counties of not more than 125,000 inhabitants may by popular vote decide to have five commissioners. The term of office of county commissioners is three years. There are six congressional districts in the State.

Politics.— Nebraska was Democratic in politics from the time of its territorial organization under the famous Kansas-Nebraska bill (q.v.) until the latter part of the territorial period when it became Republican through immigration from the strongly Republican States to the eastward and the stimulus of the change to a Republican national administration. The Democrats opposed the admission of the State under the enabling act of 1864, partially to prevent the addition of Republican senators and representatives to the Federal Congress and partially because they believed the financial and political resources of the territory too small to justify or bear the burdens of State government. The Republicans pressed statehood because their leading politicians were ambitious to attain the resulting State and Federal offices and because their party needed additional votes in the Senate in the struggle against the faction led by President Andrew Johnson. Through the impetus and inertia of the issues and passions of the Civil War the State remained decisively Republican until 1890. At about that time the Farmers' Alliance (q.v.), an organization similar to the Granges of other agricultural States, determined to take an active part in politics. In the year named a Democratic governor was elected by a small plurality over the Independent or Farmers' Alliance candidate who in turn received a small number of votes more than the Republican candidate. The Republican candidates for Congress in all three of the districts were defeated by large majorities. This revolution against the Republican party was occasioned partly by revolt against its maladministration of the affairs of the State and partly by a growing anti-monopoly sentiment which insisted on control by the State of the railway corporations, which had never been seriously attempted, and the direct regulation of transportation rates. Even the Democratic governor had vetoed the maximum railway freight bill passed by the Fusionist legislature of 1891. This dereliction of the two old parties was chiefly responsible for the rise and dominant growth of Populism. The independent movement was precipitated at the time in question by the very low prices of farm produce, and rebellion against "ten cent corn" in particular. In the meantime, as a new and easier way of paying old debts grew more desirable, "free silver," as promulgated by W. J. Bryan (q.v.), became the all-powerful Populist shibboleth. In 1894 the Fusion candidate of the Democratic and Peoples' Independent parties was elected governor as also in 1896 and 1898. In 1900 the tide turned and the State has again become Republican by a small majority. A spirit of reprisal against the East for its tariff and other sectional impositions animated the free-silver movement to a greater degree than is generally supposed. The grievances which started the independent movement which overwhelmed Republicanism in Nebraska have been in no wise abated; but democracies do not make hay while the sun shines or prepare for war in times of peace, so that during the period of good crops, and of the good prices which have naturally followed the long period of business depression, Populist reformers have either become Republicans again or are inert, and the cause of reform waits. The Populist movement was at first excited and swift to an almost revolutionary degree, yet this was owing chiefly to the pinching conditions resulting from the accidental coincidence of general industrial depression and several seasons of short crops. Though extravagant in its manifestations, and at the first visionary in some of its objects, the movement was inherently rational and legitimate, and in its political effect salutary.

Population.— The white population was only nominal at the time of the organization of the Territory because it had been set apart as "Indian country," in which white settlement was proscribed. In 1855 the Territorial census showed a population of 4,494, and in 1856, 10,716. In 1860, by the Federal census it was 28,441; in 1870, 122,993; in 1880, 452,402. The peculiar incident of the development of Nebraska is that the railways preceded settlement and improvement, for the double reason that farm produce could not reach the sole far eastern market until the railways should come to carry it, and that the people in general lacked the faith in the productiveness of the country and the courage to test it which were furnished by the strong men at the head of the railway corporations. The total foreign born population in 1900 was 177,347, of which Germany furnished 65,506;



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Sweden, 24,693; Bohemia, 16,138; Denmark, 12,531; Ireland, 11,127; England, 9,757; Canada, 8,010; Austria, 3,893; Norway, 2,883; Scotland, 2,773; Switzerland, 2,340; Italy, 752. There were 3,322 Indians and 6,269 negroes. Of the total population 564,592 were males and 501,708 females. In 1910 there were 21 cities with a population of over 2,500. Omaha had 124,096; Lincoln, 43,973; South Omaha, 26,259. The cities next in size are Beatrice, Grand Island, Nebraska City, Fremont, and Hastings, all of these running somewhat above 7,000. No proper comparison can be made of the population of the State in 1900 with that of 1890 on account of the palpable padding of the census in the latter year. Population (1910) 1,192,214.

Following are the names of the 92 counties and their county-seats:

Adams, Hastings.
Antelope, Neligh.
Banner, Harrisburg.
Blaine, Brewster.
Boone, Albion.
Box Butte, Alliance.
Boyd, Butte.
Brown, Ainsworth.
Buffalo, Kearney.
Burt, Tekamah.
Butler, David City.
Cass, Plattsmouth.
Cedar, Hartington.
Chase, Imperial.
Cherry, Valentine.
Cheyenne, Sidney.
Clay, Clay Center.
Colfax, Schuyler.
Cuming, West Point.
Custer, Broken Bow.
Dakota, Dakota City.
Dawes, Chadron.
Dawson, Lexington.
Deuel, Chappell.
Dixon, Ponca.
Dodge, Fremont.
Douglass, Omaha.
Dundy, Benkelman.
Fillmore, Geneva.
Franklin, Bloomington.
Frontier, Stockville.
Furnas, Beaver City.
Gage, Beatrice.
Garden, Oshkosh.
Garfield, Burwell.
Gosper, Elwood.
Grant, Hyannis.
Greeley, Greeley Center.
Hall, Grand Island.
Hamilton, Aurora.
Harlan, Alma.
Hayes, Hayes Center.
Hitchcock, Trenton.
Holt, O'Neill.
Hooker, Mullen,
Howard, Saint Paul.
Jefferson, Fairbury.
Johnson, Tecumseh.
Kearney, Minden.
Keith, Ogallala.
Keyapaha, Springview.
Kimball, Kimball.
Knox, Center.
Lancaster, Lincoln.
Lincoln, North Platte.
Logan, Gandy.
Loup, Taylor.
Madison, Madison.
McPherson, Tryon.
Merrick, Central City.
Morrill, Bridgeport.
Nance, Fullerton.
Nemaha, Auburn.
Nuckolls, Nelson.
Otoe, Nebraska City.
Pawnee, Pawnee City.
Perkins, Grant.
Phelps, Holdredge.
Pierce, Pierce.
Platte, Columbus.
Polk, Osceola.
Red Willow, McCook.
Richardson, Falls City.
Rock, Bassett.
Saline, Wilber.
Sarpy, Papillion.
Saunders, Wahoo.
Scott's Bluff, Gering.
Seward, Seward.
Sheridan, Rushville.
Sherman, Loup City.
Sioux, Harrison.
Stanton, Stanton.
Thayer, Hebron.
Thomas, Thedford.
Thurston, Pender.
Valley, Ord.
Washington, Blair.
Wayne, Wayne.
Webster, Red Cloud
Wheeler, Bartlett.
York, York.

History.— Nebraska, the Indian name of the principal river of the State — commonly known by its French appellation, the Platte — and meaning shallow water, was applied before the organization of the territory to all that portion of the trans-Missouri plains lying approximately between the 38th and the 43d parallels of latitude — or between the watershed of the Platte River on the north and that of the Arkansas on the south. The country to which the name now applies is noted for the Nebraska or Platte Valley route to the Pacific Northwest and the California and Rocky Mountain gold fields over the great Oregon trail, which passed from its southeast border up to and along the Platte Valley; as the initial point of the first trans-continental railroad — the Union Pacific — which also passes along the Platte Valley; as being the subject of the third great compromise of the slavery question known as the Kansas-Nebraska bill (q.v.); as the first territory the acts of whose elective legislature were not required to be submitted to the national Congress for approval; and the only State admitted into the Union on condition of the acceptance by its legislature of a condition imposed by the Federal Congress which undertook to annul a provision of its own constitution.

With the exception of the famous Lewis-Clark expedition, which passed up the Missouri River, making several encampments on Nebraska soil, in 1804, the first explorers and settlers in the State came from Saint Louis, the seat of the western fur trade at the beginning of the 19th century. The Mallet brothers, Frenchmen from Saint Louis, crossed the eastern part of the State as early as 1739, and Colonel Zebulon Pike probably crossed its southern border on his great expedition in 1806. Crooks and McClellan, of Astor's American Fur Company, made the first authentic location on the present site of Bellevue in 1810, but remained less than a year.

Manuel Lisa, a Spaniard, and field manager for the Missouri Fur Company of Saint Louis, established a trading post, called Fort Lisa, about five miles below Council Bluff, where he lived a large part of each year until 1819. He may fairly be regarded as the first bona fide white settler of Nebraska. The military division of Major S. H. Long's famous expedition up the Platte Valley to the Rocky Mountains established the first military post in Nebraska in 1819, at Council Bluff, so named by Lewis and Clark because there they held a council with the Otoe and Missouri Indians. It was located about 25 miles above the present city of Council Bluffs, but on the opposite or Nebraska side of the river. The post was first called Camp Missouri and afterward Fort Atkinson, after General Atkinson, the commander of the troops of Long's expedition, and still later, Fort Calhoun. Long's scientific party camped about five miles below at Engineer Cantonment. Captain Bonneville passed through the State over the Oregon Trail in 1832, and Frémont on his exploring expedition in 1842.

Nebraska was included in Louisiana territory after the division of the Louisiana Purchase in 1804, the lower portion called the territory of Orleans comprising the present State of Louisiana. In 1812 the name was changed to Missouri territory, in 1819 the territory of Arkansas with the present boundaries of the State on the north and south but extending to the western boundary of the Louisiana Purchase, was organized. After the admission of Missouri as a State in 1821 the remainder of the Louisiana Purchase remained without political organization until 28 June 1834, when that part of it north and east of the Missouri River was attached to Michigan. On 30 June 1834 the remaining part of the Purchase was designated as "Indian country" by act of Congress and set apart exclusively for Indian occupancy. There was, therefore, no political organization and little or no white settlement within Nebraska until its territorial organization in 1854.

The politics of the territory at the outset was largely influenced and the official appointments dictated by the Southern pro-slavery element. The first two governors were from Southern States, and many of the other appointive officers were importations from the same section. The first governor of the Territory, Francis Burt, of South Carolina, took the oath of office at Bellevue, 16 Oct. 1854, and died from the effects of his long journey from South Carolina two days afterward. He was a member of the famous Nullification Convention of 1832 and voted for the resolutions there adopted. Bellevue was the principal settlement or town of the territory and Governor Burt intended to designate it as the capital by convening the first legislature there; but Secretary Thomas B. Cuming, who succeeded him as acting governor, called the first legislature to meet at Omaha 16 Jan. 1855, and that body located the capital there. This action aroused animosity between the North Platte and the South Platte sections of the territory which continued with great bitterness until the capital was finally removed to Lincoln, its present site, by act of the first State legislature, 14 June 1867. The legislature of 1857 passed an act to remove the capital from Omaha but it was defeated by the veto of the governor. The legislature of 1858 divided in a controversy over capital removal, the majority retiring to the village of Florence, and the minority remaining at Omaha, thus precluding any practical work for that session. W. A. Richardson, the chief lieutenant of Stephen A. Douglas in the struggle over the Kansas-Nebraska Bill, was governor of the territory during the year 1858. He resigned the office on account of the rupture between Douglas and President Buchanan over the question of the admission of Kansas as a State. On 5 March 1860, a proposition for the Territory to enter statehood was defeated by a popular vote of 2,094 to 2,372. Under authority of the enabling act of 19 April 1864, which was passed by Congress in response to the petition of the territorial legislature of that year, a constitutional convention was held 4 July 1864; but the proposal of statehood having been defeated at the same election at which the delegates to the convention were chosen (6 June) it adjourned without action by a vote of 37 to 5. Political parties were first formed in 1858, the division being almost wholly on the slavery question. The 6th legislature (1860) voted to abolish slavery in the Territory; but the act was vetoed by Governor Black. A similar act by the 7th legislature (1861) was passed over Governor Black's veto. This procedure was purely tactical, as there were only five or six slaves in the Territory and they were not increasing.

The 11th territorial legislature (1866) submitted a constitution to the people who approved it by the close vote of 3,938 to 3,838 on 2 June 1866, notwithstanding that it restricted the suffrage to white men. But the bill to admit the State into the Union under this constitution which was passed by Congress 27 July 1866, failed to become effective by the refusal of President Johnson to sign it. In January 1867, another bill admitting the State passed both houses of Congress; but ostensibly for the reason that it imposed an improper condition precedent — that it should not be effective until the legislature of the proposed State should declare that there should be no denial of the elective franchise or of any other right to any person by reason of race or color — this bill was vetoed by President Johnson, but it was passed over the veto, and the legislature, convened in special session on 20 February, accepted the condition. A great debate took place in Congress over the question of the constitutionality and expediency of imposing this condition, and many Republicans of national fame opposed it on both grounds. The adoption of the 15th amendment to the Constitution of the United States soon after set aside the issue and prevented a test by the courts of the constitutionality of the condition. David Butler, Republican, was declared elected governor over J. Sterling Morton, Democrat, at the election of 2 June 1866, by the slender majority of 109. The first State legislature, whose members were elected at the same time, convened on the following 4th of July and elected John M. Thayer and Thomas W. Tipton, Republicans, United States Senators over J. Sterling Morton and Andrew J. Poppleton, who were supported by the Democratic members.

Indian Occupancy.— That part of the Territory which was settled immediately after its organization was not relinquished by the Omaha, Missouri and Otoe Indians who occupied it until March 1854, two months before the organic act was passed. The Kansas tribe had ceded their lands in the southeastern part of the Territory in 1825, and the Otoe and Missouri tribes had ceded a strip lying east of that ceded by the Kansas, in 1833. The Pawnees ceded all their lands south of the Platte River in the south central part of what is now the State in 1833. In 1857 the Pawnees ceded the rest of their possessions north of the Platte. In 1861 the Arapaho and Cheyenne tribes ceded their lands lying in the southwest corner of the State, in 1875 the Sioux ceded their lands lying north of the Platte in the western part of the State, and in 1876 the Sioux, Cheyennes and Arapahoes relinquished all claims to the remaining Indian possessions which comprised a strip along the north border of the State, lying mostly west of the 101st meridian. While the Omaha, Otoe, Missouri, and Pawnee Indians were in the main peaceable from the beginning of territorial settlement the other tribes, and especially the Sioux and Cheyennes were warlike, and constant attacks were made upon settlers up to 1868. The depredations of the Indians were especially severe during the Civil War in 1863 and 1864, and again in 1867. There is one Indian reservation in the northeastern part of the State occupied by the Omahas and Winnebagoes, the former numbering about 1,200 and the latter 1,100. All the lands of the reservation have been allotted to the Indians in severalty, and they are all citizens of the State. The tendency of the Omahas is to increase slowly and of the Winnebagoes to decrease. The Federal government maintains a school at the Omaha and Winnebago agency, another at the Santee agency, and a boarding school for Indians at Genoa.

The original Territory of Nebraska, which comprised all of the Louisiana Purchase north of Kansas and west of the Missouri River, was reduced by the organization of the Territory of Colorado 28 Feb. 1861, which took away that portion of the present State of Colorado east of the Rocky Mountains; by the organization of the Territory of Dakota, 2 March 1861, taking away that part of the States of North Dakota and South Dakota lying west of the Missouri River, and by the organization of the Territory of Idaho, — 3 March 1863 — which included the remainder of the Purchase lying west of the Dakotas, leaving Nebraska in its present territorial form with the exception of the addition, taken from Dakota in 1882, of a strip east of the Keyapaha River and west of the main channel of the Missouri River.

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Nebraska, University of, The, at Lincoln, Neb., was founded by act of the legislature in 1869. Funds for the erection of the first building were provided by the sale of lots in the then new capital city of Lincoln. This first building, now called University Hall, was completed in 1871, the lumber and part of the brick being hauled from the Missouri River in wagons. The college of literature, science and the arts was opened 6 Sept. 1871, with a faculty of five professors and 90 students. The charter act contemplated six colleges, but an amendment in 1877 reduced the number to five, merging the State Agricultural College and the College of Practical Science into the Industrial College. The Board of Regents, originally 12 members, but now 6, constitute the governing body. The University comprises the graduate school (degrees, Master of Arts and Doctor of Philosophy); the College of Literature, Science and the Arts (degree, Bachelor of Arts); the Industrial College (degree, Bachelor of Science), which includes the School of Agriculture, the School of Mechanic Arts, and the School of Domestic Science; the College of Law (degree, Bachelor of Laws); the College of Medicine (degree, Doctor of Medicine); the School of Fine Arts; the School of Music; and the summer session. Each college and school has its faculty, charged with the instruction and the immediate management thereof. Law and medicine are not organized into departments. The other colleges are so organized, having the following departments: agriculture; animal husbandry; animal pathology; astronomy and meteorology; bibliography; botany; agricultural chemistry; general chemistry; education (pedagogy); civil engineering; mechanical engineering; electrical engineering; dairy husbandry; domestic science (household arts); mechanical drawing and machine design; elocution; English language; English literature; entomology and ornithology; forestry; geology (including palæontology and geography); Germanic language and literature; Greek language and literature; Roman language and literature; Romance languages; American history and jurisprudence; European history; horticulture; mathematics; military science and tactics; philosophy; physics; physical education; political economy and sociology; zoology. Nebraska students in the College of Literature, Science and the Arts and in the Industrial College pay no tuition. Non-resident students, also all students in the professional schools and in the schools of fine arts and music, pay small tuition fees. All departments are open to both sexes on equal terms. A tax of one mill per dollar on the assessment roll of the State, together with interest income from land sales and land leases are the chief sources of revenue. The University receives the benefit of the Morrill Acts for the maintenance of instruction in branches relating to agriculture and the mechanic arts, and of the Hatch Act, in aid of agricultural experimentation. The 10 buildings on the city campus, with their class rooms, laboratories, libraries and offices, house all the departments except the school of agriculture, the work of which is done mainly at the University farm, and the College of Medicine, in which the last two years' work is given at Omaha. There are five buildings at the farm. This consists of 320 acres, a little removed from the city campus. Here are located the departments of agriculture, animal husbandry, animal pathology, dairying, and horticulture. About 100 acres are laid out in experiment plats for field crops, fruit and vegetables. Herds of cattle, sheep and swine are owned, being used for experimentation as well as for instruction. Four new buildings were recently erected, an administration building and a physics laboratory on the city campus, a hall of agriculture, a dairy building, shops, and a horticulture laboratory at the farm. The libraries accessible to the students contain about 133,300 volumes, of which 55,000 are in the University library itself. Over 500 periodicals are received, and the University possesses a copious and well chosen museum, which is supplemented in several directions by departmental museums. Duing 1910 the enrolment at the University was as follows: Graduate department, 154; College of Literature, Science and the Arts, 2,493; Professional departments, 315; Agricultural School, 165; Engineering department, 435; Department of Household Economy, 44; School of Music, 86; School of Fine Arts, 39; Summer School, 399; grand total, 3,361. From this 299 names have to be deducted on account of repetition, leaving an actual total of 3,062. Nearly half of these were women, there being women in each department.

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Nebraska City, Neb., city, **county-seat** of Otoe County; on the Missouri River, and on the Missouri P. and the Burlington & M. R. R.R.'s; about 45 miles in direct line east by south of Lincoln, the capital of the State, and 40 miles below Omaha. It is in a fertile agricultural region. It is built on the site of old Fort Kearney (1848) and was laid out in 1855. It was incorporated in 1871 and chartered in 1891. The chief manufacturing establishments are flour and lumber mills, planing mills, a cannery, brick works, breweries, a distillery, starch factory, foundries, machine shops, and cereal mills; employing in all about 2,000 persons. It has large grain elevators, cold storage buildings, lumber yards, stock yards, and packing and provision house. It is the seat of the State Institute for the Blind and the Academy of the Annunciation. It has a public library, a government building, city and county buildings, a number of churches, a high school, and public and parish elementary schools.

The government is administered under the charter of 1891, which provides for a mayor, elected biennially, and a council of eight members, one half of whom are elected by wards and the other four at large. Pop. (1890) 11,941; (1900) 7,380; (1910) 5,488.

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Nebraska River. See PLATTE.

Nebraska Wesleyan University, The, is located at University Place, four miles from the capital city of Nebraska, has its own municipal government, and is connected with the city of Lincoln by lines of electric railway. The University is a denominational institution of the Methodist Episcopal Church, organized in 1887 as the result of an effort to unify the educational interests of the denomination within the State. It consists of a College of Liberal Arts, an Academy with courses fitted to the college curriculum, a Normal School, a School of Expression, and a Conservatory of Music. It is coeducational, and its standards for degrees are those required by the college senate of the denomination for its first class institutions. Its first graduates were the class of 1890, which consisted of four members. Its present number of students is 700; its professors and instructors 40. Its college graduates number about 250; its library has 5,000 volumes; its buildings and grounds are valued at $150,000; its productive endowment is $50,000. Its present chancellor is DeWitt C. Huntington, D.D.

Nebuchadnezzar, nĕb″ū-kạd-nĕz′ar (Nabu-Kudurriuzur, «Nebo protect my dominion»), the most illustrious monarch of the New Babylonian or Chaldæan kingdom, son of Nabopolassar (q.v.). In the life-time of his father he defeated as crown prince the Egyptian Pharaoh Necho at Carchemish 605 B.C., and ascended the throne as his father's successor 604 B.C. He at once began his career of conquest, subduing Syria, and laying Judah and its king, Jehoiakim, under tribute. In 598 he marched against Jerusalem and led away into captivity at Babylon Jehoiakin, the 18-year-old son of Jehoiakim, just as he had succeeded to the throne on his father's death. With the young king the most eminent rulers of the land were carried off, 10,023 in all, together with the costly spoils of the temple and royal palace. As Zedekiah who succeeded Jehoiakin in the latter's exile entered into a treaty with Egypt Nebuchadnezzar's army besieged and captured Jerusalem a second time, carrying off Zedekiah into captivity (586 B.C.). Nebuchadnezzar meanwhile had strongly established his headquarters at Ribla in Cœlo-Syria. The remaining inhabitants of Jerusalem were taken as captives to Babylon, and the Jewish capital absolutely destroyed. For the 13 years between 585 and 573 B.C., the city of Tyre was besieged by Nebuchadnezzar to no purpose; in 572 B.C. he invaded Egypt and conquered it from Syene to the frontiers of Ethiopia. Pharaoh Hophra was defeated and dethroned and from 569 to 586 B.C. a Babylonian army occupied Egypt. Besides his activity in these campaigns Nebuchadnezzar was tireless in efforts for the security of his realm, the welfare of his people, the adorning and fortification of his capital Babylon. He restored the ruined canal and cut another, the King's Canal. At Sippara he made a lake like Lake Mœris, ten miles in circumference, which received and distributed the overflowing waters of the Euphrates, and he founded the city of Teredon at the mouth of that river. He built the Median wall as a defense to his kingdom, and completed the vast ramparts which his father Nabopolassar had begun. He beautified the royal residence with palace and temple buildings, finished the tower of the seven planets at Borsippa, restored and decorated the royal palace of his father, and built a new palace on a height surrounded by hanging gardens for the pleasure of his Median wife Amytis. This great work is said to have been completed in 15 days. He died after a reign of 43 years, 561 B.C., deeply deplored by his subjects, having been on the whole a great and wise king.

Nebulæ, The, in astronomy, a term derived from the Latin, signifying little clouds. The nebulæ may properly be divided into two distinct classes, the green and the white. Less than five per cent of the number in the catalogues make up the former class, but this disproportion is made up for in area by their greater size in many cases. The difference between the two classes is fundamental, and it is questionable even if they might not properly be designated by different names. The spectrum of the green nebulæ consists chiefly of green and blue lines with sometimes a very faint continuous spectrum,— their constitution is therefore obviously mainly gaseous. The spectrum of the white nebulæ is continuous, with, in one instance, evidence of very faintly marked bright and dark lines. Their nature is therefore uncertain, but probably they are made up largely of solid as well as gaseous matter. From their small proper motions it is not likely that any of the nebulæ are as near us as the nearer stars. The green nebulæ are distributed in and near the Milky Way; the white ones are located on either side, and are generally remote from it. In this respect they differ from the star clusters, which in other respects they somewhat resemble. While the Milky Way shines chiefly by the light of the countless stars that it contains, a portion of its light is also due to enormous areas of green nebulous matter, which serves as a luminous background to the stars themselves. Undoubtedly the finest telescopic object in the sidereal heavens is the great nebula in Orion, which belongs to this class. Its extension in a gigantic spiral fills a large part of the constellation, and is the largest nebula known outside of the Milky Way. Next to it in size and also in magnificence is 30 Doradus, in the larger Magellanic Cloud. This is also a spiral structure. The Argus and Trifid nebulæ are other fine specimens of this class. All these nebulæ are obviously connected with a large number of stars, and are possibly in process of dispersion from them. Frequently a single star will be connected with a nebular wisp. These objects are known as nebulous stars, and are evidently analogous to the larger formations.

There is a second division of the green nebulæ. These have the same spectrum, but owing to a slightly different division of the light usually present a somewhat bluish appearance. These are known as planetary nebulæ on account of their rounded well defined disks. The disks are generally somewhat diversified and contain sometimes one and sometimes two stellar nuclei. The largest and finest of the planetary nebulæ is known as the Owl nebula in Ursa major. It is so called because it was formerly supposed to resemble the face of an owl. For a few years it had two brilliant nuclei which corresponded with the two eyes. Later, first one and then the other of these disappeared, and now it has a single nucleus in its exact centre. If the planetary disk is too small to be distinguished as such, the formation is designated as a stellar nebulæ. When a *nova* or temporary star fades out, it is usually converted into one of these bodies. If the central portion of a planetary nebula is comparatively dark, it is then called a ring nebula. The best known example of this class is the ring nebula in Lyra.

Practically all the large white nebulæ exhibit a spiral structure, but they differ from the green spirals in that they are double instead of single. This can best be understood if we imagine a pliable rod which we take hold of at one end and roll up into a single spiral like a clock spring. If we take the rod by the middle and twirl it as we might a cane, we shall have a double spiral, and indeed it looks as if it were by such a whirling action that spiral white nebulæ were constructed.

The largest and most brilliant white nebula in the heavens is the great nebula in Andromeda. It is the only nebula indeed that is conspicuous to the naked eye. The one best showing its spiral nature, however, is the Whirlpool nebula in Canes Venatici. Often, as is the case with both of these objects, a secondary nucleus terminates one of the spirals. Smaller nuclei frequently occur at intermediate positions upon both spirals. If the nebular hypothesis is correct, and the solar system condensed from a former large nebulous mass, it is likely to have been from an object such as one of these, only probably on a much smaller scale. Unlike the green nebulæ, the white ones are not associated with brilliant stars, but that they are sometimes connected with small ones is shown by the fact that in 1885 a small temporary star suddenly appeared close to the centre of the nucleus of the great nebula in Andromeda. While we have little evidence bearing upon the subject, it seems most likely that the white nebulæ are condensing at present upon numerous hot stellar nuclei located in their midst. What the size of these nuclei may be we have no knowledge, but it seems likely that they are generally small as compared to our sun.

A subdivision of the white nebulæ, containing by far the largest part of them consists of small faint elliptical bodies showing no detail. It is possible that if they were nearer to us, and were better seen, that they, too, would show a spiral structure. In closing this brief summary of our knowledge of the nebulæ, we must refer to one most unexpected property that some of them have exhibited — that of variability. Three variable nebulæ have appeared and disappeared in the constellation Taurus, but the best known example is that of the Trifid nebula, a large section of which, which was formerly dark, is now bright, and apparently a region which was formerly bright is now dark. This is probably due not to a shifting of the material itself, but to a change in its luminosity. The source of this luminosity is now generally believed to be electric, although it may be suggested that the unknown gas which all the green nebulæ contain in combination with hydrogen, and which is found nowhere else in the universe, may possess properties like radium, rendering the whole gaseous formation luminous until its original atomic structure is finally broken down.

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Nebular Hypothesis, The. This term in astronomy has come to signify that process of formation of the solar system which was propounded first by Swedenborg, next by Kant, and finally by LaPlace. It is generally associated with the name LaPlace. Occasionally it is spoken of as Kant's hypothesis, but Swedenborg's name is seldom associated with it. According to this hypothesis in its modern form, the sun and its attendant planets and satellites originally existed as one vast gaseous mass of greater diameter than the orbit of Neptune. This mass contained also numberless small solid particles. Owing to gravitation it gradually condensed. By the principle of the conservation of energy, as the mass became smaller its temperature must necessarily have risen. At the same time by the relative action of the various currents existing in the original mass of gas a continuous rotation in one direction would have been set up. As it shrank in size, by the principle of the conservation of momentum, its velocity of rotation must necessarily have increased. Under these circumstances, as it continued to grow smaller and hotter, a portion of its substance, owing to centrifugal force, must sooner or later have been left behind, to revolve about it in a closed orbit.

If the structure of the outer portions was very uniform, a considerable mass of matter might be left at one time. If this were sufficiently large it would form a ring about the central body, like that which we now find surrounding the planet Saturn. If not sufficiently large, the bodies into which it would condense would revolve independently, like the belt of asteroids now surrounding the sun. If the outer portions of the original nebula were of irregular structure, an independent nebulous mass would be left behind. If this were small, it would condense into a comet, which is merely a cloud of meteors and gas resembling the original nebula, but if it were large enough to exert an appreciable gravitational effect of itself, it might condense into a separate star or planet.

It was originally supposed that a ring was always formed preparatory to condensation into a planet. This does not, however, seem necessary, and the whole nebulous mass may possibly have had a spiral structure with condensations occurring at intervals along its length, such as we see at present on a large scale in the great nebula in Andromeda and in Canes Venatici. Certain it is that nebulæ of this type are extremely common in the heavens, while ringed structures like the nebulæ in Lyra and Hydra are more rare. The process of contraction of the central mass of what was originally our nebula is still going on, and is indeed the source of the sun's heat at the present time. In order to produce the actual enormous output of solar energy, the sun's diameter must diminish at the rate of about 300 feet a year, a quantity too small for us to measure, however, even after the lapse of several centuries.

Two objections to the nebular hypothesis have been raised of late years. If the satellites are formed by the condensation of the mass of the planets, then when the planets shrink away from them, the satellites should revolve in their orbits more slowly than the planets revolve on their axes. This is true of all the satellites save the innermost one of Mars, which makes rather more than three revolutions while the planet makes one. The generally accepted explanation of this anomaly is a slight retardation of the time of rotation of the planet due to a tide formally raised upon it by the sun. If the planet revolves more slowly than the satellites, than by tidal interaction between them, the velocity of the satellites will be increased, and at the same time the two will be drawn nearer together. Should these conditions continue, the satellites would ultimately fall upon the surface of the planet. Another suggestion is that the two satellites of Mars are asteroids captured by the planet at a time when the eccentricity of its orbit was much higher than it is at present. The second objection to the nebular hypothesis is a more serious one. If the planets originally had the form of rings, then by Kepler's third law the inner edge of the ring would have revolved faster than the outer one. When the ring was condensed to form a planet, the planet and its satellites would then have revolved in a retrograde direction. With the exception of Uranus and Neptune all the planets revolve direct, that is in the same direction as the sun.

To overcome this difficulty LaPlace suggested that the rings, owing to friction among their particles, revolved as one piece. This we now know could not have been the case. Kirkwood proposed that although the planets started with a retrograde rotation, yet if in a greatly diffused condition, tidal friction would soon cause them to present always the same face to the sun. This would be tantamount to a direct rotation, and subsequent condensation might accelerate the acquired velocity up to the present observed rate of speed. Faye suggested the idea that all the inner planets were formed inside of the nebula and before it had become much condensed; that Uranus and Neptune were formed later after the central condensation had occurred; and that this would account for the difference in the direction of the rotation. Trowbridge has pointed out that if the rings were much denser near their inner edge in the case of the inner planets that this would explain their direct rotation. Of course if the planets separated from the central mass as individual bodies, not as rings, they would then all have a direct rotation. There are two objections to all these suggestions. One is that they explain the rotation of Neptune in a different manner from that of the other planets, and the other is that they do not explain the rotation of Uranus at all. This planet, or rather its satellites, and therefore probably the planet itself, revolves in a plane very nearly at right angles to the plane of its orbit.

It was suggested by the writer (consult 'Astronomical Journal' 1901, No. 511) that although the planets were condensed from the rings or spirals of the nebula they would all undoubtedly revolve in a retrograde direction, yet the tidal action of the sun acting upon them would always tend to set up a rotation in the contrary direction. Now the effect of this would be, not as Kirkwood supposed, to neutralize the original retrograde rotation, by any means, but rather to cause the planet to gradually shift the plane of its rotation, as may readily be demonstrated from the theory of the gyroscope. In its earlier stages, or if the tidal force were small, the direction of the rotation would be retrograde. Later the plane of rotation would so change as to be perpendicular to the plane of the planet's orbit, and still later the plane of rotation would be completely reversed, the planet now having simply a direct rotation.

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Necessita'rian, a name given any one who follows the philosophy or doctrine of necessity. Hobbes may be considered the founder of the English Necessitarians, and on the Continent it was developed by his contemporary Spinoza, and later by Leibnitz. Jonathan Edwards (1703–58), president of Princeton College, toward the close of his life published 'An Inquiry into the Freedom of the Will'; and Priestley (1733–1804) published his 'Doctrine of Philosophical Necessity Illustrated' in 1777.

Necessity, Fort, a former defensive work near Union, Fayette County, Pa.; built by Gen. Washington in 1754.

Neches, nĕch'ĕz, a river in Texas, which has its rise in Van Zandt County and flows southeast into Sabine Lake (q.v.). It traverses a fertile agricultural section of the State, and in its lower course passes through an oil region. Beaumont (q.v.) is on its bank a short distance from the mouth. The Neches is about 350 miles long.

Necho, nē'kō, or **Nekau,** Egyptian king, the Pharaoh-Nechoh of the Bible: b. last half of 7th century B.C.; d. 595 B.C. He was son of Psammetichus I., succeeded him in 609, attempted to hold Syria after the collapse of the Assyrian empire, and in this campaign killed at the battle of Megiddo King Josiah of Judah, whose son Jehoahaz was made king dependent on Necho. But the later campaign was less fortunate for the Egyptian king, who was defeated at Carchemish in 604 by Nebuchadnezzar, and thus lost possession of Syria. Necho's internal rule was vigorous; he built a canal from the Nile to the Red Sea and sent out Phœnician sailors to explore the African coast. This fleet is said to have circumnavigated the continent. Consult Budge, 'History of Egypt' (1902).

Neck, that part of the body in the higher animals which forms the juncture of the head with the trunk. In man the neck is formed mainly of the muscles passing from the skull to the thorax, and of the trachea and the œsophagus. There are also the cervical or neck vertebræ, in man numbering seven, the same number being nearly constant in all the *Mammalia.* The most notable exceptions are seen in the manatees and the two-toed sloth, having six neck-vertebræ; while in the three-toed sloth nine cervical segments exist. In long-necked birds as many as 25 cervical vertebræ may be present. In fishes no neck or cervical region is distinguishable. The ligamentous structures connected with the head and neck, and with the articulation of the skull upon the vertebral column, form a very complicated series; and in the lower animals especially — as in the horse or elephant — there is a strong band of fibres, forming the ligamentum nuchæ, which suspends the head on the neck. In man, the head being balanced on the spinal column, this ligament is of comparatively small size, and it extends from the occipital protuberance at the back of the skull to the spine of the seventh or last cervical vertebra. The muscles of the neck are numerous, and are generally classified and described along with those of the head. The term neck is also used in anatomy to indicate any attenuated process or part of a bone which serves to unite or support parts of larger proportions; for example, the neck of the femur or thigh-bone, the neck of the humerus, of the radius, etc. See ANATOMY.

Neckar, nĕk'kär, Germany, an affluent of the Rhine, which rises in the Black Forest in Würtemberg, near one of the sources of the Danube, and flows through Baden into the Rhine at Mannheim, after a course, including windings, of about 240 miles. The area of its basin is 4,150 square miles. It is navigable for small boats from Heidelberg near its mouth, so far as Cannstadt, but the actual navigation of the river extends only to Heilbronn, up to which steamers ply.

Necker, Jacques, zhăk nā-kăr (English, nĕk'ėr), French minister of finance: b. Geneva, Switzerland, 30 Sept. 1732; d. Coppet, near Geneva, 9 April 1804. In 1750 he went to Paris to enter the banking-house of his uncle, M. Vernet, and having become partner in a banking business, soon acquired an immense fortune. After giving up his business he held the post of resident minister at Paris, representing his native town. Ambitious of literary distinction, he produced his 'Eloge de Colbert' (1773), which gained the prize of the French Academy. His 'Essai sur la Legislation et le Commerce des Grains' (1775) was violently attacked by the economists, owing to his expressing himself in favor of restrictions on the exportation of corn. In July 1777 he obtained the post of director-general of finances. Malversation, under the preceding reign, had caused a great deficit, to which the American war made additions. New taxes would have been unpopular, and Necker endeavored to meet the exigency by loans and reforms. But the partisans of Turgot found fault with his innovations. In 1781 he published his 'Compte rendu au Roi,' relative to his administration. This statement of the financial condition of the nation found favor with the people; but displeased the court, and Necker was dismissed in May 1781. He went to Switzerland, where he published his work 'Administration des Finances' (1784). The errors and prodigality of Calonne, who next had the management of the state finances, increased Necker's reputation: the latter returned to France in 1787, wrote against Calonne, who had accused him of being the author of the deficit, and was exiled in consequence. But in 1788 Necker was recalled as comptroller-general, he supported the convocation of the States-General, which was the wish of the nation, and the giving a double representation to the *tiers état.* When the court in a royal sitting, held on 23 June 1789, wished to annul the decision of the Third Estate, by which the National Assembly was constituted, Necker refused to appear in the sitting. On 11 July the advisers of the king succeeded in inducing him to give Necker his dismissal, and to order him to leave the kingdom. No sooner was his removal known than all Paris was in a ferment. The storming of the Bastille followed (14 July), and symptoms of popular violence became so alarming that the king found himself compelled to recall the banished minister. His first object was to restore tranquillity, and security of person and property. But as minister of finance he was obliged to propose measures unacceptable to the populace. His moderate opinions in regard to the administration of government did not keep pace with the wishes of those who dictated to the people. Under these circumstances he wrote to the Assembly, in September 1790, requesting his dismissal. His daughter, Madame de Staël, has given a somewhat too favorable view of his character as a statesman in her 'Considerations.' His ability, though considerable, was much overrated in his day. Among his other works are: 'De l'Importance des Opinions Religieuses' (1788); 'Réflexions présentées à la Nation Française' (1792); 'Du Pouvoir Exécutif dans les Grands Etats' (1792); 'De la Révolution Française' (1796); and 'Dernières Vues de Politique et de Finances' (1802). A collective edition of his works was published at Paris in 1820–2. Consult: Nourrisson, 'Trois Révolutionaires: Turgot, Necker, et Bailly' (2d ed. 1886); Hermann, 'Zur Geschichte der Familie Necker' (1886).

Necker, Susanne Curchod de Nasse, French matron: b. Geneva, Switzerland, 1739; d. Coppet, Switzerland, 1794. She came of a French Protestant family and as a girl was noted for her beauty, wit, and wide knowledge which so attracted the historian Gibbon that he wished to marry her. In 1764 she married Jacques Necker (q.v.) and in Paris her house soon became frequented by the most distinguished men of the day, among them Buffon, Saint Lambert, and Marmontel. She educated her daughter, the famous Madame de Staël in this atmosphere and devoted much time to philanthropic work, founding the hospital named for her. She wrote: 'Reflexions sur le Divorce' (1794), and 'Mélanges' (published posthumously in 5 vols.). See D'Haussonville, 'Le Salon de Madame Necker' (1882).

Necker de Saussure, dė sō-sür, **Adrienne Albertine,** French author: b. Geneva, Switzerland, 1765; d. 1841. She was married to Jacques Necker, a cousin of Madame de Staël with whom she was intimate. She published: 'Notice of the Character of Madame de Staël' (1820); and 'Progressive Education' (2 vols. 1828–32).

Nec'romancer, The. See RAMIREZ, IGNACIO.

Nec'romancy (Greek *nekros,* dead, and *manteia,* divination), the divination of the future by questioning the dead, under the belief that the spirits or souls of the dead could be communicated with, and could give information regarding the future. This, like many superstitious rites, it is supposed, is of the highest antiquity. Mention is made of necromancy in the Old Testament; for instance, in Deuteronomy (xviii. 11), where it is forbidden. In the 28th chapter of the first book of Samuel the witch of Endor is related to have raised up Samuel to gratify the desire of Saul. In many parts of Greece there were oracles of the dead, and necromany was practised in the temples by priests or other religious persons. It was also practised in Thessaly, notorious for magic and sorcery. From the first the practice was condemned by the Christian Church, and during the Middle Ages necromancers were persecuted in all ways, imprisoned, tortured, burned. See also MAGIC.

Nec'ronite (Greek, «a corpse»), a variety of feldspar occurring in granular limestone near Baltimore, Md. It is nearly white in color, and derives its name from the fact that it emits a fetid odor when struck.

Necrop'olis (Greek, «the city of the dead»), a term applied to the cemeteries in the vicinity of ancient cities. In classical antiquity the name is given to a suburb of Alexandria, where the corpses were received and embalmed. Here Cleopatra applied the asp to her breast.

Necro'sis (Greek, literally, «a state of death»), in pathology, the death of a circumscribed piece of tissue. In surgery, the term is specifically applied to the death of a bone, in part or in whole, but especially in mass. The part affected by necrosis, like a slough of the soft tissues, has no longer any organic connection with the body. This dead portion, especially when detached from the bone to which it belonged, is called the sequestrum. If the necrosis is confined to the superficial layers of the bone-substance, the operation of nature by which the dead layers are thrown off is called exfoliation. The line of demarcation is the boundary between the living tissue and the dead. If it is the whole of the outer case of the bone that suffers, the periosteum or investing membrane sometimes remains healthy, and deposits a lymph which rapidly ossifies and surrounds the diseased part with a healthy crust. The bones that most usually suffer from necrosis are those of the lower extremity, the tibia and femur; necrosis of the soft parts is called gangrene (q.v.).

Nectanebo I., nĕk-tā-nē'bō, king of Egypt: d. 364 B.C. The first king of the 30th dynasty he came to the throne in 382, formed an alliance with Evagoras of Cyprus against the Persians; successfully met a Persian invasion in 374; was conservative in religion and restored many old temples. The British Museum possesses his sarcophagus. This great general was succeeded by Teher or Taho, who was supplanted by NECTANEBO II. in 361, also a general and also an ally of the Greeks, with whose help he put down a pretender to the throne and for a time held the Persians off, only to succumb to them (343) after the defection of Mentor, one of his Greek generals. He left Egypt and fled to Ethiopia — or by a late and untrustworthy tradition to Macedonia where he seduced Queen Olympias and thus was the father of Alexander the Great. This story is evidently suggested by a longing for poetic justice to the king defeated by the Persians, who in turn were crushed by Alexander. Egypt was a Persian province from 343 to 332, when it came into the control of Macedonia.

Nec'tar, a sweet liquid secreted by a glandular surface structure in a plant called a *nectary;* and the name is extended by botanists to any aborted part of a flower in the place between the gynœcium and andrœcium (see FLOWER) where nectaries usually occur. Nectar varies in composition with the plant that produces it, but consists mainly of water, with sugar and grape-sugar, and various carbo-hydrates and proteids which make it nutritious and give it flavor and odor. Nectaries may occur in many places, and are of various forms. Those outside of flowers are most often found at or near the base of the petiole, or about stipules. Within flowers the nectar glands form a more or less continuous ring between the stamens and pistil; or the disk itself may secrete a sweetish fluid; or other parts, as the petals (for example, in aconite) may become nectaries. In many cases the secretion exudes directly from the surface and not from any definite pore or excretory opening.

Such structures belong mainly to seed-producing plants and serve the purpose of attracting insects whose visits are beneficial in effecting cross-pollination (see FLOWERS AND INSECTS) as they go from flower to flower in search of this delectable food, which bees, wasps, and others transform into honey. The nectaries on the outside of certain plants attract ants (q.v.) which protect the plant.

The terms nectar and nectary are derived from the name given by the Greek poets to the drink of the immortal gods on Mount Olympus. It was poured out by Hebe, the goddess of Youth, and conferred immortality. Homer describes it as resembling red wine. It was joined with ambrosia, the immortalizing food of the gods, and like it was of most delicious odor.

Nec'tarine, a smooth-skinned peach formerly regarded as a distinct species, which may be derived from the seed of a peach or from a peach bud by bud variation, and which, conversely, may produce a tree bearing peaches by either of the means mentioned. In all ways as an orchard fruit the nectarine is managed like the peach, but is far less popular. Commercial orchards of this tree are planted in California, the product being mainly dried or canned. Consult: Darwin, 'Animals and Plants under Domestication' (1868). See PEACH.

Nedjed, nĕd'jĕd, **Nejd**, or **Nejed**, Arabia, the general name signifying «elevated country,» applied to the central Wahabi kingdom in great part covered by the heights of Jebel Toweyk. The capital is Riad (pop. 30,000), a centre of Mohammedan orthodoxy and fanaticism. A great part of the region is sandy desert interspersed with fertile spots inhabited by Bedouins. The more elevated districts with towns and villages inhabited by the settled population, feed immense droves of camels and the best breeds of Arab horses. The climate is healthful. Consult: Palgrave, 'Central and Eastern Arabia' (1865).

Needell', MRS. **John Hodder**. See NEEDELL, MARY ANNA LUPTON.

Needell, Mary Anna Lupton, English novelist: b. London 1830. She was a writer and student in early life and was then married to J. H. Needell of Allington, Dorsetshire. During her married life she suspended writing, but resumed it in 1881. Among her works are 'Ada

Gresham' (1851); 'Catharine Irving' (1853); 'Julian Karslake's Secret' (1881); 'The Story of Philip Methuen' (1886); 'Stephen Elliott's Daughter' (1891); 'Passing the Love of Woman' (1892); 'Unstable as Water' (1902). Several of these have been republished in this country.

Needfire. See FIRE.

Needham, nēd'am, **Charles Willis,** American college president: b. Castile, N. Y., 30 Sept. 1848. He was graduated from the Albany Law School and in 1874-90 practised law in Chicago where he assisted in founding the University of Chicago. In 1890 he removed to Washington where he has established a law practice and since 1897 has been connected with Columbian University of which he became president in 1902.

Needham, James George, American entomologist: b. Virginia, Ill., 18 March 1868. He was graduated in 1891 from Knox College, Galesburg, Ill., and from Johns Hopkins in 1893. He became professor of biology at Lake Forest University in 1898 and has had charge of the New York Entomological Field Station since its establishment in 1899. He has written 'Elementary Lessons in Geology' (1895); 'Outdoor Studies' (1898); etc.

Needham, John Turberville, English naturalist: b. London, England, 10 Sept. 1713; d. Brussels, Belgium, 30 Dec. 1781. He was a Roman Catholic priest and was in his later years director of the Academy of Sciences at Brussels. He published: 'New Microscopical Discoveries' (1745); 'Idée sommaire, ou Vue Générale du Système physique et métaphysique sur la Génération' (1780); etc.

Needle, a small steel instrument, sharp pointed at one end, and having an eye or hole through which is passed a thread in sewing and stitching. Needles were known to the ancients, who ascribed the invention of them to the goddess Bellona; but at first they consisted only of small spikes of wood or fish-bones. The Phrygians and Babylonians must have been acquainted with needles, as they were celebrated for their skill in embroidery. Needle-makers were incorporated at Nuremberg in 1370, and at Augsburg in 1406. The first needle-work in England is said to have been established in 1560.

There are about 22 processes in the present manufacture of needles. The first is the cutting of the coils of wire into two-needle lengths by a guillotine shearing machine. The wire is of the best crucible steel, and requires to be very carefully gauged to size. After being cut, the lengths of wire are raised to a dull red heat and placed in loose bundles inside iron rings to be straightened by rolling each bundle backward and forward on a face plate with a slightly curved bar, through which the rings project. The wires are next pointed at both ends. An arrangement is used by which the wires are withdrawn — one closely following another — from a hopper by a pulley revolving at right angles to the grindstone, the wires being held to the face of the pulley by an india-rubber band. In their passage between the pulley and the grindstone the wires (double-needle blanks) revolve on their axis and become pointed at one end, and the process is repeated for the pointing at the other end. The fine steel dust formerly so injurious to the health of the hand-grinders, is now drawn away from the operative by the suction of a strong current of air. The stamping of these two-length blanks in the middle by the hand-worked stamping machine, so as to produce the flat of the eyes and the mark for the holes, as well as the punching of the holes by a screw press, can now be accomplished by more expeditious machines. By the newer method, the wire blanks are automatically fed into a quick-running belt-driven machine, in which a punch and dies form the prints or flats for the eyes. Then two oval holes are punched through the two prints of each blank by a vertical belt-driven punching-machine. After being eyed the still double blanks — they are now rather double needles joined at the heads by thin fins — are «spitted» through their eyes on two wires flatted at one end to retain them. The burr made by the punch and die (stamping) is now removed by filing the spitted needles on both sides, and after being broken in two between the heads, which are then also smoothed by filing, a row of single needles is left on each spit.

The needles then undergo a tempering process. They are first hardened by being laid on a plate and raised to a red heat in a furnace, after which they are dipped in cold oil, kept cool by running off a portion as it gets warm, and replacing it by an equal quantity of cold oil. The needles, now hard and easily broken, are made less brittle by placing them on a continuous band of wire gauze, which travels slowly over gas flames. They are now rolled one by one under the finger on a smooth stone, and thus the bent ones are weeded out. In parcels of 50,000 they are next washed and scoured with soap to remove any of the oil used in tempering, which still adheres, and the eyes are afterward «blued» to soften them. In the case of needles of fine quality the eyes are gilt. By one method the eyes are polished by threading them loosely on wires carried by standards fixed to a tray or platform, which is moved rapidly with a reciprocating motion in a horizontal plane. In about one hour, with the assistance of a little fine emery and oil, the constant swinging of the needles on the wire smooths their eyes so as not to cut the thread. But the eyes of the best needles are hand-polished with fine emery on flax threads. The next step is to grind the heads and set the points by hand on a rapidly-revolving stone of fine texture. For the final polishing of the shanks, the needles are fed in a longitudinal direction, in rows one deep, between transverse leather-covered rollers, with holding rollers above them. Besides turning on their own axes, a lateral as well as a backward and forward motion is given to the rollers, which produces a high polish on the needles. The needles now require to be laid with their heads in one direction. A gun-metal disk revolving vertically takes up each needle by a groove in its periphery, and lets it fall on an inclined glass plate. Owing to the taper form of the pointed ends of the needles, they describe an arc in revolving so that those with the points in one direction roll to the right and the others fall round to the left. The finished needles, though intended to be of the same size, always differ to some extent in their lengths, so that those of exactly one size require to be separated from other lengths by the sorting process in which gauges are used. Lastly, the needles are papered either by being spitted on cloth pasted to paper, or by being made up into small packets, in which case the bits of paper are cut and folded in a machine like that used for envelope-making.

Special kinds of needles are required for sewing canvas, for upholstering, in surgical operations, etc. Knitting needles are slender straight rods with rounded ends, and are used in pairs or sets of four or five. They vary in length and are made of wood, bone, or ivory, but chiefly of steel. Crochet needles have a hook at one end. Some needles are used in machinery. They are made of steel and are used for hosiery and stockinet work. Sewing-machine needles have a hook, eye, or barb at the pointed end, and are used with a single thread in making a single loop stitch both with eye and with barb. The best known sewing-machine needle is the one with the eye at the pointed end, having a long groove on one side and a short groove on the opposite. The needle used on leather is the wax-thread needle, and includes many shapes. Instead of an eye these needles are formed with hooks by which the thread is pulled through a hole made by an awl. The welting needle is a section of a circle in shape, used for putting welts on boots and shoes.

In the United States the manufacture of needles has become an important industry. The annual output amounts to 1,200,000 gross, the product being valued at about $1,000,000.

Needle Gun. See FIRE-ARMS; ORDNANCE.

Needle-ore, the common name for Aikinite also called Aciculite and acicular bismuth. It is a sulphid of bismuth, lead and copper, and is found native in various localities. It has a dull metallic lustre and is of a blackish lead-gray color. It occurs in embedded acicular crystals of needle-like formation and hence derives its name.

Needle Peak, a mountain of the Panamint Range in the southeastern part of Inyo County in California. It takes its name from its peculiar sharp pointed summit. It is in a region which bears many marks of the Glacial period, the shape of the mountains, the large number of glacial lakes, the markings on the rocks, and the vegetation. Needle Peak is southwest and a short distance from «Death Valley.»

Needlefish, a marine gar of the genus *Tylosurus* (see GAR), especially *T. notatus.*

Neefs, nāfs, more correctly, NEEFFS, **Pieter,** the Elder, Dutch painter: b. Antwerp about 1578; d. there between 1656 and 1661. He was a pupil of the painter of architectural views, Hendrik van Steenwijck (q.v.), began his career as a painter in the same department of art in 1605, and in 1609 was elected a member of St. Luke's Guild of painters in Antwerp. His paintings are numerous, and he is well represented in the Louvre at Paris, the Pinakothek at Munich, the Museum at Ghent, the Gallery at Dresden, and other European collections. They are mainly interiors of churches, the gloom of the building being lit up with torches or tapers and are remarkable for aërial and linear perspective. The technique is delicate and highly finished. He generally secured the services of some other artist to introduce figures in his views, among others Teniers, Francken and Van Thulden.

Neenah, nē'nạ, Wis., city in Winnebago County; on Lake Winnebago at its outlet, and on the Fox River; also on the Chicago, M. & St. P., the Wisconsin C., and the Chicago & N. R.R.'s; about 50 miles north by west from Milwaukee and 30 miles southwest of Green Bay. It is on an island upon which is also Menasha, the two cities being really one in commercial interests, but each having an independent municipal government. Neenah was settled in 1846 and in 1850 was incorporated as a village. In 1873 it received its city charter which was revised in 1883. The chief industrial establishments are stove works, flour and paper mills, foundries, machine shops, shoe factory, brick works, tobacco factories, and lumber mills. There is a large trade in manufactures, lumber and farm products. The city is well built and has many attractions for tourists. It is a favorite fishing resort. It has several parks, a commodious opera house, city buildings, several fine churches and school buildings. It has a fine public library. The waterworks are owned and operated by the city. Pop. (1890) 5,083; (1900) 5,954; (1910) 5,734.

Neer, nār, **Aart van der,** Dutch painter: b. Amsterdam 1603; d. there 9 Nov. 1677. He became famous in his native city about 1640 and was particularly happy in moonlight effects among the canal scenery of Holland, as well as in winter landscapes, skaters on the ice, fires or conflagrations. These midnight scenes of raging flame are sometimes filled with figures, which give them a powerful dramatic effect. His pictures are found in most public galleries. He ended his days as an innkeeper.

Neerwinden, nār'vĭn-dĕn, Belgium, a village in the province of Liège, 16 miles from Louvain, which gives its name to two battles fought in the vicinity: (1) on 29 July 1693 when the French under the Marshal of Luxembourg gained a victory over the English and Dutch allies under William III. of Britain; (2) on 18 March 1793 when the French under Dumouriez were defeated by the Austrians under the Prince of Coburg.

Nees von Esenbeck, nās fōn ā'zĕn-bek, **Christian Gottfried,** German botanist and natural philosopher: b. in the Odenwald 14 Feb. 1776; d. Breslau 16 March 1858. He was long a practising physician, but became professor of botany successively at Erlangen (1818), Bonn, (1819), Breslau (1831), and Berlin (1848–52). He displayed much originality of thought in his 'Naturphilosophie' (1841), forming Vol. I. of his uncompleted 'System der spekulativen Philosophie.' Among his other writings are: 'Handbuch der Botanik' (1820–1); 'Bryologia Germanica' (1823–31).

Neesima, nē'sĭ-mạ, **Joseph Hardy,** Japanese educator: b. Tokyo, Japan, 14 Feb. 1843; d. Kioto, Japan, 23 Jan. 1890. He came to the United States to be educated and found a friend in Alpheus Hardy whose name he adopted. He studied at Amherst and continued his theological course at Andover and upon his return to Japan in 1874 was warmly received by his countrymen. He founded Dōshisha College at Kioto and was its president. See his 'Life and Letters' edited by Arthur S. Hardy (1892).

Nef, John Ulric, American chemist: b. Herisau, Switzerland, 14 June 1862. He was graduated from Harvard University in 1884. In 1887–9 he was professor of chemistry in Purdue University, Lafayette, Ind., and in 1889–92 he was engaged at Clark University, South Atlanta, Ga. He became professor of chemistry in the University of Chicago in 1892 and since 1896 has been head professor of that department.

Neff, nĕf, **Felix,** Swiss philanthropist: b. Geneva 8 Oct. 1798; d. there 12 April 1829. He entered the army, rose to the grade of sergeant in the artillery, but at 21 devoted himself to the elevation of the people of the Fressinières valley, and in 1823 settled among them as pastor, teacher, engineer and farmer. His noble work transformed the degraded inhabitants of his great parish and speedily wore out his health so that shortly before his death he had to retire to Geneva.

Negapatam, nĕg-ạ-pạ-tăm', India, a town and port of the Tanjore district, Madras. It has an active trade with Ceylon, the Straits Settlements, etc., and is the terminus of the South Indian Railway. It was an early settlement of the Portuguese; was taken by the Dutch in 1660, and by the British in 1781.

Negative Quantity. See MATHEMATICS.

Negatives, Development and Treatment of. The principles of development of both photographic glass dry-plate and film negatives are the same. Glass plate or film negatives may be developed in a photographic dark-room or in special small portable dark-rooms or daylight developing machines. Photographic dry plates have spread upon the surface a film of a gelatine emulsion carrying and incorporated with it a certain amount of bromide of silver. The emulsion is flowed over the plate surface in a warm fluid condition, which solidifies when cooled into a film. Sensitized photographic films are prepared by the emulsion spread upon a transparent support resembling celluloid. When the prepared glass plate or sensitized film is exposed in the camera, the light acts upon the gelatino bromide of silver film in such a way, it is believed, as to convert the bromide of silver in the film into a sub-bromide which becomes thereafter susceptible to the action of a reducing agent known as the developer. The bromide of silver not acted upon by the light is not affected chemically by the developer. The chemical change which the developer induces in the bromide of silver, is a reduction of the light affected parts, to metallic silver. Anything which will effect this reduction is known as a developing agent. There are numerous new ones being added continually to the list. Most developers are derivatives from benzine, common ones being pyrogallol, known as "pyro," quinol, amidol, metol, ortol, glycin, and eikonogen. While any of the developing agents alone would reduce the exposed silver bromide to metallic silver, in practice it is found best to combine the developing agent with an alkali, carbonate of soda, ammonia or carbonate of potash. The alkali is called the accelerator. To prevent rapid oxidization of the alkaline developer, sodium sulphite is added and preserves the developer prior to the mixture with it of an alkali, oxalic acid, as well as other acids of a similar character like sulphuric or sulphurous are added, which will keep the solution from discoloration. There are many different developing agents and many different formulæ for making developing solutions. These differ slightly from each other in their action, but the general method of use is the same. In compounding developers it is sometimes advisable to introduce potassium bromide, or ammonium bromide, particularly in the development of plates fully or somewhat over-exposed. They are known as restrainers and have the power of retarding the action of the developer, which is sometimes desirable. Instead of dissolving the bromide of potassium or ammonia in the developer, it is usual to prepare a weak solution of bromide in water about five grains to five or eight ounces of water and immerse the plate in this solution for three or four minutes, then remove and transfer the plate to the developing tray and pour upon it the normal developer. The preliminary bromide treatment checks the rapidity of development and prevents an over-exposed plate from becoming flat or foggy.

In general to obtain the proper density in the film for most commercial plates, it has been found that four grains of pyrogallic acid, metol, ortol, glycin, pyro catechin, adurol, eikonogen, diogen, imogen, edinol, and other similar developer agents, to the ounce of water is about the right proportion. Bromide of potassium aids in increasing the density. In some cases where it is desired to secure thin quick printing negatives full of detail the percentage of pyrogallic acid can be reduced one-fourth.

The method of developing film or plates in a dark-room is as follows:

The sensitive dry plate must be removed from the original package in a dark room or a room illuminated only by a reddish orange colored light, also for inserting in the plate in the holder and development, both are done under the same condition. After removing the plate from the plate holder, or film from film spool, it is well to place them in clear water and allow them to soak for a few minutes. This insures the developing solution flowing evenly over the surface of the film, which is essential for even development. The plate or film strip is then placed in a tray of developing solution, previously prepared, or, in the case of glass plates, the solution may be poured over the plate in the tray. The developer at once begins its action and should be kept in motion by rocking the tray, or the film should be passed through and through the developer until development is complete. In about a minute after immersion, parts of the plate are seen to grow dark where the developer is changing to metallic silver the light affected silver bromide. The operator watches the progress of the change by holding his plate up to the colored light from time to time.

In about four or five minutes, with a normal developer, all the susceptible silver bromide has become metallic silver, forming the negative image of the object photographed. The silver is densest where the light has acted longest on the sensitive film; thinnest where there was the least light as in the shadows. When the film is fully developed so that no further details appear in the shadows, the plate or film is rinsed in water to remove the developer, and is ready for the second chemical step, called «fixing.»

The chemical commonly used for this process is hyposulphite of soda — «hypo» in the photographic vernacular. To prepare the fixing solution, about one ounce of «hypo» is dissolved in six ounces of water and the solution is poured into a separate tray in which the negative is immersed. The action of the solution on the negative is to dissolve away the unreduced silver in the plate or film, a process requiring about five minutes. As the action of the fixer proceeds, the milky color of plate or film is seen gradually to disappear. When all the soluble silver has been removed — indicated by the total disappearance of the whitish color — the negative is chemically complete and may be exposed to light with safety. The negative should now be removed from the «hypo,» rinsed in clear water and placed in a bath of alum and water for a few minutes. Instead of alum a formaline solution may be used. These solutions toughen the gelatine so that it will not be readily marred or scratched in subsequent handling. The negative should then be washed thoroughly in water for about an hour to eliminate all the hypo and alum. If a glass negative, it may be immediately placed in a rack to dry and the drying hastened by placing the rack in a window or in front of an electric fan. In the case of film negatives, a short soaking in a glycerine solution is advisable. This is to prevent the contraction of the gelatine side of the film, in drying, from curling the film. After removal from the glycerine solution, the negative is dried without washing. Drying requires a number of hours under ordinary conditions. When dry it is advisable to wipe the back of film negatives with a soft cloth moistened in benzine to remove the glycerine, which is sticky.

Glass plate negatives are either developed one at a time or as many as will cover the bottom may be placed in the developing tray at once. Film may be developed in the entire strip of 2, 4, 6, 10 or 12 negatives, as the film cartridges are prepared; or they may be cut apart and each exposure handled separately. The cutting apart may be done at any time after development has proceeded sufficiently to show the dividing line between the exposures on the film strip. The temperature of both developing and fixing solutions should be between 60 and 70° F., as should the alum hardening bath. If the temperature of the solutions is materially higher, the gelatine emulsion softens unduly, although development is accelerated. If the solutions are below 60°, development is retarded.

Sometimes after development, negatives are found to be too «dense» to give good results in printing — that is, the metallic silver has formed too thick over the whole negative, or parts of it. This may be due to several causes, which are not in the province of this article to explain. «Dense» negatives may be improved by what is called reducing. This is done by immersing the negative, previously washed with care, in a weak bath of ferri-cyanide potassium, a small amount of hyposulphite of soda, and water. This solution gradually dissolves away the reduced metallic silver of the negative image. When enough has been removed to make the negative of proper density, the reduction is checked by washing, and the negative is dried in the usual way. Negatives may be reduced locally by applying the solution to the parts with a small brush. In place of ferricyanide of potassium, persulphate of ammonia without hypo can be used. The formula is as follows:

Persulphate of ammonia	15 grains
Water	1 ounce

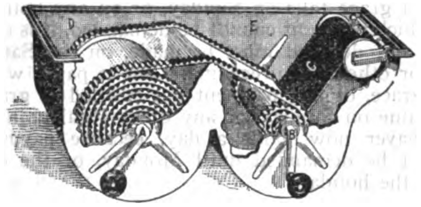
Make a fresh solution each time and add two drops of nitric acid. The salt readily dissolves. The negative if dry should be soaked for half an hour in water and then be immersed in the ammonia solution. Reduction occurs gradually, when sufficient wash the negative under the tap and immerse for ten minutes in ten per cent solution of sodium sulphite for two or three minutes, which checks the action. Then wash and dry.

Negatives are sometimes underdeveloped; owing to a very short exposure negatives can not be developed far enough and when fixed are too thin to give good prints, not enough metallic silver having been formed. Such negatives may be «intensified,» which is a sort of re-development. A negative must be well washed to eliminate the hypo prior to the intensification process. There are different ways of accomplishing this with a variety of formulæ. A common way is to immerse the negative in a solution containing bi-chloride of mercury. This changes the dark negative image to a white color, the metallic silver in the film having been reduced to silver chloride by association with the mercuric chloride. The whitened or bleached negative is now transformed, after being well washed with water, by immersing in a bath of water and dilute ammonia or a solution of sodium sulphite and water, until the white color becomes brown or black. The action of the alkali changes the chloride to metallic silver again. The negative now possesses greater opacity in the high lights and will yield more vigorous and brilliant prints. The intensifying process may be repeated by washing the film carefully between each step. Negatives may be intensified locally by applying the chemical solutions to the desired parts.

How far to carry the development of glass plates or film is an important point in negative making. Some operators rely entirely on their judgment in the case of each negative, examining it by the dark-room light to see when the desired density has been attained. The uncertainty of results in thus trying to stop development at just the right point resulted in the introduction of what is known as the «factorial system» of development. This system is based on the theory that a certain definite relation exists between the total length of time required for development, and the time elapsing between immersing the plate in the developer and the first appearance of the image. Different developers have different factors according to their various actions. So, multiplying the time elapsing from immersion in developer to appearance of image, by the factor of the developer used, gives total length of development needed. The factor of any developer at a definite uniform temperature can be determined by experiments.

Underlying this «factorial system» is the theory that in every case the time of exposure of plate or film alone determines the final quality of the negative. The eminent authorities Alfred Watkins and Hurter and Driffield hold this view, which is being generally accepted. The gradation between light and shadow in the negative (not its general «density» or «thinness») really determines its printing quality; that what this scale of gradation or ratio of contrast is going to finally be, is fixed before the image makes its appearance in the developer. But, if the operator knows before development of over or under exposure, he may influence the contrast in his negative somewhat by altering his developer. In view of the above, time development is now recognized by many workers as the correct way of development, the length of time to elapse between the immersion of plate or film into the developer to the completion of development varying with solutions of different compositions and their temperatures.

The Kodak developing machine is based on the principles of time development. This machine is for film only. With it film is developed without a dark-room. Introduced in 1901 the Kodak developing machine became immediately popular with film workers and has become the favorite method of development. The advantages of machine development are many. No dark-room is needed; the operations are simpler and therefore more likely to be successful. The general results are better than by the older development method. With the Kodak developing machine the operator of course does not have to depend upon his own judgment as to when development should cease. He times development, thus being certain of his results. The chemicals to be used with the machine are prepared in powder form, only needing to be combined with water to form the proper solutions. The chemical principles of development in the Kodak developing machine and the dark-room are identical. The machine itself is a light-tight metal box containing a colored transparent apron. Its operation is as follows:



Kodak Developing Machine.

The spool of film is inserted in the machine so that the black paper, which protects the roll of film from light in the cartridge, will lead from the top, as shown in cut, the transparent apron (F) having first been wound onto arbor «A.» The black paper is then pulled out and the end attached to arbor «B» by slipping under the wire guard. Arbor «B» is then turned to the right until the word «stop» printed on the black paper to mark the beginning of the film strip appears. The developer is then poured into compartment «E,» the end of apron (F) is hooked onto arbor «B» and the top put on the machine. The operator then turns handle to the right until the time of development (four or five minutes) has expired. The film «G» winds up inside of apron, but with the face not touching it, thus allowing free action of the developer. The cover is then removed from machine, developer poured off and fixing solution poured in; the cover replaced and the handle turned again for about five minutes, when the fixing is complete. After fixing, the film is removed from machine by taking hold of either end of black paper and pulling out of machine, the film being taken hold of when it appears and pulled free from the black paper. Nothing remains to be done except to wash the film, harden it in the alum solution and pin up to dry. Film must always be developed in the entire strip when using the machine.

Developing Formulæ.

PYRO DEVELOPER.

1.

Pyrogallic acid	½ ounce
Sulphuric acid	20 minims
Pure water	32 ounces

2.

Sulphite of Soda (anhydrous)	3 ounces
Carbonate of Soda	2 “
Pure water	32 “

To develop take

Water	2 ounces
No. 1	1 ounce
No. 2	1 “

EIKONOGEN DEVELOPER.

1.

Eikonogen	1 ounce
Sulphite of Soda (crystals)	3 ounces
Water	60 “

2.

Carbonate of Potash	3 ounces
Water	30 “

To develop take

No. 1	2 ounces
No. 2	1 ounce
Water	2 ounces

METOL DEVELOPER.

A.

Distilled or boiled water	10 ounces
Anhydrous Sodium Sulphite	250 grains
Metol	50 “

B.

Distilled or boiled water	10 ounces
Potassium Carbonate C. P.	1 ounce

For normal developer take 3 parts of A and add 1 part of B.

For over-exposure take 3 parts of A, add ½ part of B, 4 parts of water, and 10 to 60 minims of a solution of Potassium Bromide, 1 to 10.

Carbonate of Soda can be substituted for Carbonate of Potash.

METOL-HYDRO DEVELOPER.

Make two solutions as follows, each will keep a long time:

1.

Metol	50 grains
Hydroquinone	40 “
Potassium Metabisulphite	½ ounce
Distilled water	10 ounces

2.

Sodium Carbonate (crystals)	2 ounces
Distilled water	10 “

For use mix equal parts. Bromide of Potassium should be added in small quantities in cases of great over-exposure.

EDINOL DEVELOPER.

Edinol	240 grains
Potassium Metabisulphite	120 “
Sodium Carbonate	800 “
Sodium Sulphite	400 “
Potassium Bromide	40 “
Water	10 ounces

For a developer put 1 part of above into 7 parts of water. Can be used for several negatives. Is of a light straw color.

FIXING SOLUTION.

Hyposulphite Soda	4 ounces
Water	16 "

ALUM BATH.

Saturated solution of alum allowed to settle and decant.

TO MAKE FARMER'S REDUCER.

Dissolve 1 ounce Ferri-Cyanide of Potassium in 9 ounces water, forming a 10 per cent solution. Add enough of this solution to fresh Hypo bath to make it a light straw color.

ANOTHER REDUCER.

Ferric Chloride	1 dram
Hydrochloric Acid	2 drams
Water to make 10 ounces.	

INTENSIFIER.

1.

Mercuric Chloride	1 dram
Ammonium Chloride	1 dram
Water	4 ounces

2.

Ammonia (.880)	1 dram
Water	4 ounces

Bleach in No. 1, wash well, and blacken in No. 2.

Bibliography.— Cook, 'More Light on Negative Making'; Lambert, 'The Perfect Negative'; Todd, 'Practical Reference Book Part II.'; Clark, 'Development'; Adron, 'Modern Developers and How to Use Them'; Penlake, 'Developers — Their Use and Abuse'; Abney, 'Treatise'; Brothers, 'Photography'; 'The Photography Annual'— An English Year Book, and 'Photo Miniature' (Vol. II., No. 15.).

L. B. Jones,
Eastman Kodak Company.

Negaunee, nĕ-gâ'nē, Mich., city in Marquette County; on the Duluth, S. S. & A., and the Chicago & N. R.R.'s; about 12 miles west by south of Marquette. It was settled in 1870 and in 1873 was chartered as a city. It is in the iron region of the State and has within the city limits several productive iron ore mines. The ridge (Iron Mountain) upon which Negaunee is located is over 1,000 feet above Lake Superior. The chief industries of the city are connected with the mining and shipping of iron ore. It has excellent public and parish schools. The city owns and operates the electric-light plant and the waterworks. Pop. (1910) 8,460.

Negley, nĕg'lĭ, **James Scott,** American soldier: b. Liberty, Pa., 22 Dec. 1826; d. Plainfield, N. J., 8 Aug. 1901. He was educated at the Western University of Pennsylvania and served in the ranks through the Mexican War. At the outbreak of the Civil War he organized a brigade, was commissioned brigadier-general and joined the Army of the Ohio. He defeated the Confederates at Lavergne in 1862 and was promoted to the rank of major-general for gallant conduct at Stone River. Commercial and railway enterprises engaged his attention after the war and in 1869–73, 1875–7, and 1885–7 he was a member of Congress.

Neg'ligence, in law, there are recognized three degrees of negligence: *ordinary*, the want of ordinary care or diligence; *slight*, the want of great care or diligence; and *gross*, the want of slight care or diligence. The person charged with negligence must have been under an obligation to exercise care or diligence either assumed by contract or imposed by law. An alleged act of negligence must always be the proximate cause of the injury sustained; but any injury caused to a person by another who at the time is exercising due care is not actionable. The question of negligence is usually one for a jury, and the onus of proof rests on the plaintiff, except when the thing resulting from the negligence speaks for itself. A master is responsible for the negligence of his servants, but in no case can redress be had where contributory negligence on the part of the plaintiff is proved.

Nego'tiable Instrument, any note, bill, contract or document which can be endorsed and transferred to a third party. In addition to negotiable paper (q.v.), other written instruments considered negotiable are deeds, insurance policies, contracts, liens, judgments, etc.

Negotiable Paper, either promissory notes or bills of exchange, payable to the bearer or order. These are evidences of debt or money due and may be transferred to a third party by endorsement or delivery. The third party may sue for the amount in his own name. A sealed paper, unless issued by a corporation or State, is not usually deemed negotiable. The demand for payment of paper thus negotiated must be made when the note falls due, or to use the common phrase, at its maturity. But this is not at the expiration of the time when the note is made payable on the face of it. The law adds three whole days, which are called days of grace. At first, these were, as the name intimates, days of favor or mere indulgence; but usage, and now law, have converted them into an absolute right. In most of the States, statutes provide that all negotiable paper, not payable at sight or on demand, is entitled to three days of grace, unless it be expressly agreed otherwise. This is sometimes done, but not often; and the words used for this purpose are, simply, «without grace.» One distinction is important. These days retain so much of their original character of mere indulgence, that if the last day of grace falls on Sunday, or on any holiday on which payment cannot be demanded, it is now due, and demand must be made, on the Saturday or other day preceding. But if paper without grace, or any payment not entitled to grace, falls due on Sunday, or any other legal holiday, the payer now gains a day, because payment cannot be demanded until Monday, or the day after the holiday.

Negri, nä'grē, **Ada,** Italian poet: b. Lodi, near Milan, 3 Feb. 1870. She became a schoolteacher at Motta-Visconti, on the Ticino, and in 1892 published a small volume of poems, 'Fatalità,' which in Italy aroused a general interest and by 1894 had passed through six editions. She received from the city of Florence an honorary stipend of $340 (1,700 lire) annually for a period of 10 years, and was appointed an instructor in literature at the Scuola Normale of Milan. His further work includes the volume 'Tempeste.' Much of her verse is an appeal for the working-classes. There is a German translation by Jahn of some of the poems. Consult: Heyse, 'Deutsche Rundschau' December 1894; Dornis, 'La Poesie italienne contemporaine' (1898).

Negritos, nā-grē'tōz, the negroid race inhabiting the Philippine Islands, the Andaman Islands, and the Malay Peninsula; in the Philippines they are called Aëtas or Itas. The negritos of the Philippines may be considered typical of their race; they are of small stature, seldom being more than four feet eight inches in height, with brachycephalic head form; their skin is dark, almost black, their hair short and woolly, and their features resemble those of the negroes, though the lips are not so thick. They are true savages, depending for their food upon hunting and wild roots; they do not build villages nor stable huts, but roam through the mountains in small bands of 50 or 60. They make baskets of a rude sort and their bows and arrows for hunting; tattooing is regularly practised among them.

They are found chiefly in the islands of Luzon, Panay, Palawan, Negros, Cebu, and Mindanao; and their number is estimated in the later United States reports as 30,000. Their origin and relationship to other races present many interesting ethnological questions which have not been satisfactorily settled; their geographical distribution, however, leaves little doubt that they were the original inhabitants of the Philippine Archipelago and at one time practically the sole possessors of the islands; they were probably driven back into the mountainous interior by invasions of primitive Malayans (see Philippine Islands).

Negro, a name properly applied to the races inhabiting the continent of Africa, originally between lat. 10° N. and 20° S. The term does not include the inhabitants of Northern Africa, the Egyptians, Berbers, Nubians, Abyssinians and others. Neither do the Hottentots in South Africa belong to the negro race. The term negro, therefore, is not synonymous with African, and is not a national appellation, but denotes an ideal type constituted by certain physical characters, namely, black skin, woolly hair, flat nose, thick everted lips, and a prognathous form of skull.

Out of Africa, negroes are found in the United States, the West Indies, Brazil, Peru, the Cape Verde Islands, and Arabia. They are rare in Europe, Polynesia, and Australia. Negroes were nearly unknown to the Hebrews and the Homeric Greeks; the Egyptians, however, about 2300 B.C., became acquainted with negroes through the conquests of their rulers, and represented them on their monuments as early as 1600 B.C.; for nearly 35 centuries the type has remained unchanged in Egypt. Negroes were unknown to the Greeks until the 7th century B.C., their Ethiopians being merely any people darker than the Hellenic, like the Arabs, Egyptians, Libyans, or Carthaginians, none of which are negroes.

The negro race is divided naturally into two great divisions: (1) African negroes, (2) Papuans or Melanesians. There are four sub-divisions of African negroes, according to locality: (1) West Sudan and Guinea; (2) Central Sudan and Chad Basin; (3) East Sudan and Upper Nile; (4) South Africa. Authorities estimate their number at 130,000,000, with probably 20,000,000 full-blood or half-caste negroes, either slaves or descendants of slaves, chiefly in tropical or sub-tropical America, and enumerate the following as the chief anatomical and physiological points in which the negro differs most from his own congeners:

1. The abnormal length of the arm, sometimes reaching to the knee-pan.
2. Prognathism (Facial angle 70°, in Caucasian 82°).
3. Weight of brain, 35 ounces (in gorilla 20 ounces, average Caucasian (Europe or America) 45 ounces).
4. Full black eye, black iris, and yellowish sclerotic coat.
5. Short, flat, snub nose, broad at extremity, with dilated nostrils and concave ridge.
6. Thick, protruding lips, showing inner surface.
7. Very large zygomatic arches.
8. Exceedingly thick cranium, enabling him to use the head as a weapon of attack.
9. Weak lower limbs, terminating in a broad, flat foot, with low instep, projecting and somewhat prehensile great toe, and "lark heel."
10. Complexion deep brown, blackish, or even black, not due to any special pigment, but to the greater abundance of coloring matter in the Malpighian mucous membrane.
11. Short, black hair, distinctly woolly, not frizzly.
12. Thick epidermis, cool, soft, and velvety, mostly hairless, and emitting a peculiar odor described as hircine.
13. Frame of medium height, thrown somewhat out of the perpendicular by the shape of the pelvis, the spine, the backward projection of the head, and the whole anatomical structure.
14. The cranial sutures, which close much earlier in the Negro than in other races.

The native African negroes display considerable ingenuity in the manufacture of weapons, in the working of iron, in the weaving of mats, cloth, and baskets from dyed grasses, in the dressing of skins of animals, in the structure of their huts and household utensils, and in the various implements and objects of use in a barbarous state of society. Their religion consists in the worship of idols and fetishes, representing a supreme power which they all acknowledge; they believe also in good and evil spirits, in witchcraft, charms and spells, omens, lucky and unlucky days, etc.; they make fetishes of serpents, elephants' teeth, tigers' claws, and many similar objects, and reverence wooden images and sacred things, which they think have received a peculiar power from their divinities to drive away evil spirits, and protect them from danger, disease, and witchcraft. They make prayers and offerings to their idols, and have sacred songs, festivals, dances, ceremonies, and places; they sacrifice animals and sometimes human victims, especially during funeral obsequies; they have their priests and holy men, who are also magicians and doctors. They believe generally in an after life, without any distinct idea of retribution, and some tribes in the transmigration of the human soul into a gorilla, or other bird, beast, reptile, or fish. Being very fond of music, they have many ingeniously contrived musical instruments, generally of a noisy character; they have a keen sense of the ridiculous, and are of a cheerful disposition; though cruel to their enemies and prisoners, and setting little value on human life; they are naturally kind-hearted, hospitable to strangers, and communicative of their joys and sorrows; the females are remarkably affectionate as mothers and children, and as attendants on the sick, even to foreigners. They are less dirty in their persons and dwellings than most other barbarous races. For the history and development of the negro in America, see Negro in America and Negro Education.

References.— Bleek, 'The Languages of Western and Southern Africa' (1856); Cust, ‹Modern Languages of Africa› (1883); Keane, ‹Man, Past and Present› (1899); Johnston, ‹The River Congo› (1884); Junker, ‹Travels in Africa› (1892); Schweinfurth, ‹The Heart of Africa› (1874).

Negro Education. The negro race in America has grown from 20 native Africans imported into the country as chattel slaves in 1619, to 10,000,000 of free men, entitled under the Federal Constitution to all the rights, privileges and immunities of citizens of the United States, in 1904. The great task of educating these millions has been a phenomenal undertaking and the results have been still more phenomenal.

It was the general policy of the 16 slave-holding States of the South to prohibit by fine, imprisonment and whipping the giving of instruction to blacks, mulattoes or other descendants of African parentage, and this prohibition was extended in most of the slave States to «free persons of color» as well as to slaves.

But it has been the general policy of the slave system in all ages to keep the slaves in ignorance as the safest way to perpetuate itself. In this respect the American slave system followed the beaten path of history, and thus furnished the strongest argument for its own undoing. The ignorance of the slave is always the best safeguard of the system of slavery, but no such theory could long prevail in a democracy like ours. There were able and distinguished men among the slaveholders themselves who rebelled against the system and the theories by which it sought to perpetuate itself. Such Southern men as Thomas Jefferson, Henry Clay, Cassius M. Clay, and hundreds of others, never became reconciled to the system of slavery and the degradation of the slave.

The general character of the laws enacted on this subject by the slave States can be inferred from the following law, passed by the State of Georgia in 1829:

> If any slave, Negro, or free person of color, or any white person shall teach any slave, Negro or free person of color to read or write either written or printed characters, the said free person of color or slave shall be punished by a fine and whipping, at the discretion of the court; and if a white person so offend, he, she or they shall be punished with a fine not exceeding $500 and imprisonment in the common jail, at the discretion of the court.

There were no laws in the slave code more rigidly enforced than those prohibiting the giving or receiving instruction by the slaves or «free persons of color.» And yet in nearly all the large cities of the Southern States — notably in Charleston, Savannah, and New Orleans — there were what were styled «clandestine schools,» where such instruction was given. Those who maintained them and those who patronized them were constantly watched and often apprehended and «beaten with many stripes,» but the good work went on in some sort until 1860, when the war that was to be «the beginning of the end» of the whole system of slavery, put a stop to all such effort for the time being.

There is no more heroic chapter in history than that which deals with the persistence with which the slaves and «free persons of color» in the slave States sought and secured a measure of intellectual and religious instruction; for they were prohibited from preaching or receiving religious instruction except by written permit and when at least five «white men of good reputation» were present at such gatherings. But there has never been a time in the history of mankind when repressive laws, however rigidly enforced, could shut out the light of knowledge or prevent communion with the Supreme Ruler of the universe by such as were determined to share these noblest of human enjoyments. True, only a few, a very few, of the blacks and «free people of color» were able to secure any appreciable mental instruction; but the fact that so many of them sought it diligently in defiance of fines and penalties is worthy of notice and goes far toward explaining the extraordinary manner in which this people crowded into every school that was opened to them after the war of the rebellion had swept away the slave system and placed all the children of the republic upon equality under the Federal Constitution. Nor was this yearning for mental instruction spasmodic; 34 years after the war all the school houses, of whatever sort, opened for these people are as crowded with anxious pupils as were the modest log school houses planted by New England men and women while the soldiers of the disbanded armies of the North and South were turning their faces homeward. A race so imbued with a love of knowledge, displayed in slavery and become the marvel of mankind in freedom, must have reserved for it some honorable place in our national life which God has not made plain to our understanding.

In the free States of the North very little more provision was made, as late as 1830, by the State for the education of the Negro population than by the slave States. There was no prohibition by the State against such instruction, but there was a very pronounced popular sentiment against it, when prosecuted by benevolent corporations and individuals. In 1833 the Connecticut legislature enacted the following black law, for the purpose of suppressing a «school for colored misses» which Miss Prudence Crandall had been forced to open in self-defense, at Canterbury:

> Whereas, attempts have been made to establish literary institutions in this State for the instruction of colored persons belonging to other States and countries, which would tend to the great increase of the colored population of the State, and therefore to the injury of the people; therefore,
>
> Be it enacted, etc., that no person shall set up or establish in this State any school, academy, or other literary institution for the instruction or education of colored persons, who are not inhabitants of this State, or harbor or board, for the purpose of attending or being taught or instructed in any such school, academy or literary institution, any colored person who is not an inhabitant of any town in this State, without the consent in writing, first obtained, of a majority of the civil authority, and also the selectmen of the town, in which such school, academy or institution is situated, etc.
>
> And each and every person who shall knowingly do any act forbidden as aforesaid, or shall be aided or assisting therein, shall for the first offense forfeit and pay to the treasurer of this State a fine of $100, and for the second offense $200, and so double for every offense of which he or she shall be convicted; and all informing officers are required to make due presentment of all breaches of this act.

The cause of this law was the acceptance by Miss Crandall of a young colored girl into her select school for young ladies. The parents of the white students insisted upon the dismissal of Miss Harris, the bone of contention, but Miss Crandall refused to do so, when the white students were withdrawn. Miss Crandall then announced that she would open her school for "young ladies and little misses of color." The people of Canterbury protested against this course, and persecuted legally and otherwise Miss Crandall and her 20 pupils. When they found that they could not intimidate the brave woman the legislature was appealed to, and the law was enacted. Under it Miss Crandall was arrested and placed in the common jail. The case was tried three times in the inferior courts, and was argued on appeal before the court of errors 22 July 1834. The court reserved its decision and has not yet rendered it. The obnoxious law was repealed in 1838.

Schools established for the education of Negro youth were assaulted and wrecked in free States, but the good work steadily progressed. Private schools sprang up in all the Middle and New England States, Pennsylvania, New York, and Massachusetts leading in the work, their white citizens contributing largely to their support. There were many of these schools, some of them of splendid character, in Boston, Providence, New York, Philadelphia, Washington and Cincinnati. They were gradually absorbed into the public school system, and none of them now exist in an independent character, except the Institute for Colored Youth at Philadelphia, Lincoln University, in Chester County, and Avery Institute at Allegheny City, all in Pennsylvania.

In 1837 Richard Humphreys left $10,000 by will, with which the Institute for Colored Youth was started, 30 members of the Society of Friends forming themselves into an association for the purpose of carrying out the wishes and plans of Mr. Humphreys. A remarkable feature of the constitutions adopted by the trustees, in view of the present consideration of the subject by those concerned in Negro education, is the following preamble:

"We believe that the most successful method of elevating the moral and intellectual character of the descendants of Africa, as well as of improving their social condition, is to extend to them the benefits of a good education, and to instruct them in the knowledge of some useful trade or business, whereby they may be enabled to obtain a comfortable livelihood by their own industry; and through these means to prepare them for fulfilling the various duties of domestic and social life with reputation and fidelity as good citizens and freemen."

The measure of progress which has been made in public opinion and in the educational status of the Negro race in the Middle and New England States can easily be estimated by the fact that as recently as 1830 no Negro could matriculate in any of the colleges and other schools of this splendid group of States, and that now not one of them is closed against a black person, except Girard College at Philadelphia, whose founder made a perpetual discrimination against people of African descent in devising his benefaction; that Negro children stand on the same footing with white children in all public schools benefits; that the separate school system has broken down entirely in the New England States and is gradually breaking down in the Middle States, New Jersey and Pennsylvania being the only States in the latter group which still cling to the principle; and that in many of the public schools of both groups of States Negro teachers are employed and stand upon the same footing as white teachers. Indeed, Miss Maria L. Baldwin, an accomplished black woman, is principal of the Agassiz School, at Cambridge, Mass., and in the large corps of teachers under her, not one is a member of her own race.

All this is a very long stride from the condition of the public mind in the Middle and New England States when Negro children were not allowed to attend any public school or college and when a reputable white woman was persecuted, jailed and her property destroyed, in 1834, for accepting a young colored woman into her select school. This remarkable change in public sentiment argues well for the future of the Negro race and for the republic, which for more than a century has agonized over this race problem, and is still anxious about it in the 16 Southern States, where a large majority of the Negroes reside and will, in all probability, continue to reside for all time to come.

Dr. A. D. Mayo, one of the best authorities on educational matters in the United States, says that "it is still a favorite theory of a class of the representatives of the higher university and college education to proclaim the invariable legitimate descent of the secondary and even elementary schooling of the people always and everywhere from this fountain head," the Southern States, and that, "in one sense, this assertion is 'founded on fact.'" But, although most of the Southern States were committed to the theory of public education, the system of slavery stood in the way of the development of the theory. Popular education and slavery, like oil and water, will not mix. The educational energy of the South expanded rather along academic and collegiate than common school lines. The slave-holding aristocracy drew the social line against the poor whites as well as the slave blacks, and while dooming the latter to mental darkness by stringent laws, rigidly enforced, the same result was accomplished in the case of the former by the steady development of the old English theory of academy education, chartered for the most part by the State but supported almost wholly by their patrons, and therefore inaccessible to the children of the poor whites. It was due to this fact that so very large a percentage of the southern white population figured in the first census after the War of the Rebellion as illiterate and so figure to a large extent even to-day, 29 years after the beneficent operation of the public school system in all of the States of the South.

In the South, because of the existence of the slave system more than anything else, drifted away from the theory of public school education, prior to 1860, it has nobly rectified its mistake since 1870. Upon this point Dr. Mayo says, speaking of Virginia, which has always set the pace for her sister States of the South — and especially in the matter of education, under the leadership of Dr. W. H. Ruffner (from 1870 to 1882), who has been appropriately styled the Horace Mann of the South:

> But the condition of the educational destitution in which the State found itself in 1865, in the hour of its dire extremity, was the logical result of the narrow English policy it has pursued in this as in other directions; and in 1870 the cry went up, from the sea to the most distant recesses of the western mountains, for the establishment of the American people's common school.
>
> In nothing has the really superior class of Vir-,

> ginia more notably declared its soundness, persistence, and capacity to hold fast to a great idea than in the way in which it stood by the educational ideas of Jefferson through the one hundred turbulent years from the outbreak of the War of the Revolution to the inauguration of the people's common school in 1870.

As it was with Virginia, so it was with the other Southern States. A revival was begun in public or common school education in 1870, which is still in progress, such as swept over New England and the Middle States from 1830 to 1860. Broken in fortune and bowed with defeat in a great Civil War, the South pulled itself together as a giant rouses from slumber and shakes himself, and began to lay the basis of a new career and a new prosperity in a condition of freedom of all the people and in the widest diffusion of education among the citizens through the medium of the common schools. Perhaps no people in history ever showed a more superb public spirit and self-sacrifice under trying circumstances than the people of the South have displayed in the gradual building up of their public school system upon the ruins of the aristocratic academy system. The work had to be done from the ground up, from the organization of the working force to the building of the school houses and the marshaling of the young hosts. The work has required in the aggregate, perhaps, the raising by taxation of $514,922,268, $100,000,000 having been expended in maintaining the separate schools for the negro race. This must be regarded as a marvelous showing when the impoverished condition in which the war left the South in 1865 is considered. But it is a safe, if a time-honored saying, that «where there is a will there is a way.» The Southern people found a way because they had a will to do it; and it is not too much to claim that the industrial prosperity which the South is now enjoying is intimately connected with the effort and money expended in popular education since 1870.

The total enrolment of the 16 Southern States and the District of Columbia for the year 1896-7 was 5,398,076, the number of Negro children being 1,460,084; the number of white children 3,937,992. The estimated number of children in the South from 5 to 18 years of age was 8,625,770, of which 2,816,340 or 32.65 per cent were children of the Negro race, and 5,809,430 or 67.35 per cent were white children. The number of Negro children enrolled was 51.84 per cent of the Negro population and 67.79 of the white population. When the relative social and material condition of the former is contrasted with that of the latter, it must be admitted that the children of the former slaves are treading closely upon the heels of the children of the former master class in the pursuit of knowledge as furnished in the public school system.

During the year 1896-7 it is estimated that $31,144,801 was expended in public school education in the 16 Southern States and the District of Columbia, of which, it is estimated, $6,575,000 was expended upon the Negro schools. Since 1870 it is estimated that $514,922,268 have been expended in the maintenance of the public school system of the Southern States, and that at least $100,000,000 have been expended for the maintenance of the separate public schools for Negroes.

The significance of the facts contained in the two foregoing paragraphs will be appreciated by Europeans as well as Americans. The fact that 2,816,340 children of former slaves were in regular attendance in the public schools of the late slave-holding States of the South during the year and that $6,575,000 was expended for their maintenance, gathered entirely from public taxation and funds for educational purposes controlled by the States, should be regarded as the strongest arguments that could be presented to Americans or to foreigners to prove that the race problem in the United States is in satisfactory process of solution. The people of the Southern States, the old slave-holding class, have not only accepted in good faith the educational burden placed upon them in the addition of 8,000,000 of people to their citizenship, but they have discharged that burden in a way that must command the admiration of the world. That my own people are discharging their part of the obligation is shown in the statistics of school attendance and in the further fact that it is estimated they have amassed since their emancipation $300,000,000 of taxable property. While this may seem small as a taxable value as compared to the aggregate of taxable values in the Southern States, it is large, indeed, when the poverty of the Negro race in 1865, with all the advantages and disadvantages of slave education and tradition to contend with, are considered. When a race starts empty-handed in the serious business of life, what it inclines to and amasses in a given period is valuable almost wholly as a criterion upon which to base a reasonable deduction as to its ultimate future. The Negro race is compelled to go forward in the social scale because it is surrounded by forces which will not permit it to go backward without crushing the life out of it, as they crushed the life out of the unassimilable aboriginal Indian races of North America. It is clear that the Negro race, in its desire for American education, possesses the prime element of assimilation into the warp and woof of American life, and if its desire for the Christian religion be added we have the three prime elements of homogeneous citizenship as defined by Prof. Aldrini, namely, habitat, language and religion.

It seems well to say this much, adduced from the statistics of common school education in the late slave States of the 16 Southern States and the District of Columbia, where the bulk of the Negro people reside, as a logical conclusion in a problematical situation, concerning which many wise men are disposed to indulge a pessimism which confuses them as well as those who have to deal immediately with the perplexing condition of affairs. The common school statistics of the Southern States leave no room for doubt as to the ultimate well-being of the Negroes residing in those States.

The extraordinary development of the public school system of the 16 Southern States and the District of Columbia has been hastily recorded since 1870. It is a record worthy of the proud people who made it,—people who have from the foundation of the republic been resourceful, courageous, self-reliant; rising always equal to any emergency presented in their new and trying circumstances, surrounded on every side, as they were, by a vast undeveloped territory, and by a hostile Indian population, and fatally handicapped by a system of African slavery, which proved a millstone about the neck of the people until it was finally abolished, amid the smoke and flame and death of a hundred battles in 1865. There are none so niggardly as to deny to the Southern people the full measure of credit which they deserve for the splendid spirit with which they put aside their prejudices of more than two centuries against popular common school education on the one hand, and their equally prescriptive prejudice against the education of the Negro race under any circumstances on the other. Few if any people in the various history of mankind have so completely overcome two such prejudices. On this point Dr. Mayo says:

> Almost 100 years ago young Thomas Jefferson drew up a scheme for the education of the people of Virginia, which, had it been adopted, would have changed the history of that and of every southern State and the nation. He proposed to emancipate the slaves and fit them, by industrial training, for freedom; to establish a free school for every white child in every district of the colony; to support an academy for boys within a day's horseback ride of every man in the Old Dominion, and to crown all with a university, unsectarian in religion, elective in its curriculum, teaching everything necessary for a gentleman to know. This plan received the endorsement of many of the most eminent men of the day, and exalts the fame of Jefferson as an educator even higher than his reputation as a statesman.

All that Jefferson dreamed and outlined for the people of Virginia and of the South has been more than accomplished for both races in Virginia and in the South. The possibilities of a common school, collegiate and industrial education have been placed in easy reach of all the people, and the people are justifying the splendid faith of the Sage of Monticello by the earnestness with which they are taking advantage of the opportunities provided for them by the States and a munificent Christian philanthropy — a philanthropy which has given fully $40,000,000 of money and thousands of devoted men and women teachers to illuminate the mental darkness generated by the system of slavery. Surely no better monument than this philanthropy could be erected to perpetuate the memory of Horace Mann and Henry Barnard, in relighting the fires of popular education in the Middle and New England States, for without their labors and sacrifices in this cause that philanthropy would not have been possible.

But the public school system of the Southern States had to have other and more substantial foundation than was offered at the close of the War of the Rebellion, in 1865, by the academy and college system which had been fostered and developed as best adapted to a social condition whose cornerstone was the slave system. Without this foundation, firmly and wisely laid in the fateful years from 1865 to 1870, by the initiative of the Federal Government, magnificently sustained by the philanthropy and missionary consecration of the people of the New England and Middle States, the results which we have secured in the public school system of the South from 1870 to the present time would not have been possible. All the facts in the situation sustain this view.

It is creditable to the people of the New England and Middle States that they, who had been engaged for four years in a Titanic warfare with their brethren of the Southern States, should enter the Southern States in the person of their sons and daughters, and with a voluntary gift of $40,000,000, or more, to plant common schools and academies and colleges, in the devastation wrought by the Civil War, upon the sites where the slave auction block had stood for 250 years, thereby lifting the glorious torch of knowledge in the dense mental darkness with which the slave system had sought to hedge its power; nor is it less creditable that the Southern people accepted this assistance and builded upon it a public school system which promises to equal that in any of the other sections of the republic.

In anticipation of the condition of affairs that would arise when hostilities should cease, as early as the spring of 1865, before the war was over, an act was passed by Congress providing for the relief of the destitute of the South. The act was entitled “an act to establish a bureau for the relief of freedmen and refugees.” On 20 May 1865, Major-General O. O. Howard was appointed commissioner of the Freedman's Bureau. General Howard, — who founded the institution which bears his name at Washington and gave it a princely endowment, — “gave,” says the historian Williams, “great attention to the subject of education; and after planting schools for the freedmen throughout a greater portion of the South, in 1870, five years after the work was begun, he made a report. It was full of interest. In five years there were 4,239 schools established, 9,307 teachers employed, and 247,333 pupils instructed. In 1868 the average attendance was 89,396, but in 1870 it was 91,398, or 79¾ per cent of the total number enrolled. The emancipated people sustained 1,324 schools themselves, and owned 592 school buildings. The Freedman's Bureau furnished 654 buildings for school purposes.”

In 1879, according to the same authority, “there were 74 high and normal schools, with 8,147 students, and 61 intermediate schools, with 1,750 students in attendance. In doing this great work, — for buildings, repairs, teachers, etc., — $1,002,896.07 was expended. Of this sum the freedmen raised $200,000. This was conclusive proof that emancipation was no mistake.”

Mr. Williams says further that it appears from the reports of the Freedman's Bureau that the earliest school for freedom was opened by the American Missionary Association, at Fortress Monroe, Va., September 1861, and before the close of the war Hampton and Norfolk were leading points where educational operations were conducted; but after the cessation of hostilities teachers were sent from the Northern States and schools for freedmen were opened in all parts of the South. During the five years of its operations the bureau made a total expenditure of $6,513,955.55. No money was ever more wisely or beneficently expended. While a goodly portion of it was expended in food and clothing, and the like, for the destitute freedmen, by far the most of it went into school houses and into the salaries of school teachers, and finally became the basis if not the inspiration of the public school system of the Southern States; it certainly did become the inspiration and the foundation of the 178 schools for secondary and higher education which exist to-day independently of the public school system or of State control, although many of them are recipients of State assistance.

While the Federal Government was planting these schools among the freedmen, the people of the Middle and New England States were sending thousands of dollars into the South and sending an army of devoted men and women to back up and carry forward the educational work among the freed people. In the extent of it, it was and it continues to be the most striking example of Christian brotherhood and benevolence in the annals of mankind. Through the agency of the Federal Government and Northern philanthropy, schools for the freed people were planted everywhere, and grew and prospered, and continue to grow and prosper, as such schools never have done before.

After 30 years of effort there are 25,615 Afro-American teachers in the schools of the South, where there was hardly one when the work began; some 4,000 men have been prepared, in part or in whole, for the work of the Christian ministry, and a complete revolution has been effected in the mental and moral character of Afro-American preachers, a service which no one can estimate who is not intimately informed of the tremendous influence which these preachers exercise everywhere over the masses of their race; the professions of law and medicine have been so far supplied that one or more representatives are to be found in every large community of the South, as well as in the North and West, graduates for the most part of the schools of the South; and all over the South are men engaged in trade occupations whose intellects and characters were shaped for the battle of life by the New England pioneers who took up the work where their soldier brothers laid it down at the close of the war. But the influence of these teachers upon the character, the home life, of the thousands who are neither teaching, preaching nor engaged in professional or commercial pursuits, but are devoted to the making of domestic comfort and happiness for their husbands and children, in properly training the future citizens of the republic, was one of the most necessary and far-reaching that was exercised, and the one which to-day holds out the promise for the best results in the years to come.

It was these New England men and women who labored all over the South from 1865 to 1870 who made possible the splendid public school results. Their labors did not end in the field of primary education in 1870; they remained at their posts until they had prepared the 25,000 Negroes necessary to take their places. And even unto to-day hundreds of them are laboring in some one of the 169 schools of secondary and higher education maintained for the freed people.

In the inauguration and development of the educational work in the Southern States and the District of Columbia there have been other potential agencies than those already enumerated. It has been shown that the Federal Government, operating through the Freedman's Bureau, of which Major-General O. O. Howard was commissioner, between 1865 and 1870 established 4,239 schools, employing 9,307 teachers, with an enrolment of 247,333 pupils, at a total expense of $1,002,896.07, of which the freedmen themselves raised $200,000; that the American Missionary Association, founded in 1846, was among the first agencies to enter the southern educational work, as it has since been the most active and effective; and that the Southern States, from 1870, when they assumed control of the common school system, to 1896–7, spent in primary education, $514,922,268, of which at least $100,000,000 was devoted to the free education of the slaves. These enormous expenditures were largely supplemented by private benevolence, estimated at a total of $40,000,000, much of which went into primary school buildings and education, the buildings in most instances having been gradually relinquished to the States.

As the American Missionary Association was among the first to enter the southern school work, it is proper to give it a conspicuous place in this monograph. The extent of its operations in the southern field can be inferred from the 53d annual report of the executive committee. From this report it appears that the association has in the southern educational work of secondary and higher education 5 chartered institutions, 45 normal and graded schools, 26 common schools, being 76 schools, with 414 instructors and 12,428 pupils. The receipts for the current work for the year were $297,681.98; expenditures, $296,810.84. The total receipts for all purposes for the year were $370,963.44, of which $71,960.50 is credited to income from the Daniel Hand fund. The work of this association has been inestimable.

At the annual meeting of the American Missionary Association, at Providence, R. I., October 1888, it was announced that Daniel Hand, of Guilford, Conn., had given the association $1,000,894.25, in trust, to be known as the «Daniel Hand educational fund for colored people,» the income of which shall be used for the purpose of educating needy and indigent colored people of African descent, residing, or who may hereafter reside, in the recent slave States of the United States.» In addition to this princely gift Mr. Hand provided that his residuary estate, amounting to the sum of $500,000, should be devoted to the same purpose, to be disbursed through the association. Mr. Hand made his wealth in the South, where he settled in Augusta, Ga., in 1818, and he, therefore, had an intimate knowledge of the educational needs of the emancipated people. He was a man of devout nature.

But the fund which had the most influence upon the development of the primary and secondary education of the Southern States was that of $2,000,000 established by George Peabody, of Danvers, Mass. (the first gift of $1,000,000 being made 7 Feb. 1867, the second $1,000,000 being added 1 July 1869). In addition, $1,100,000 in bonds, endorsed by Mississippi, and $384,000 Florida bonds were given to the trustees appointed to administer the trust, but these bonds were ultimately repudiated by Mississippi and Florida, although both of them were beneficiaries of the trust,— Mississippi by $86,878 and Florida by $67,375, from 1868 to 1897. The general purposes of the trust, as Mr. Peabody stated it, in his letter to the 16 trustees designated by him, were that «the income thereof should be applied in your discretion for the promotion and encouragement of intellectual, moral or industrial education of the young of the more destitute portions of the southern and southwestern States of our union; my purpose being that the benefits intended shall be distributed among the entire population, without other distinction than their needs and the opportunities of usefulness to them.»

The trustees of the Peabody fund, of which the Hon. Robert C. Winthrop was chairman, were particularly fortunate in securing as the first general agent Dr. B. Sears, then president of Brown University. Dr. Sears died 6 July 1880, and was succeeded 2 Feb. 1881, by Dr. Curry,— a southern man,— learned, eloquent, an indefatigable worker, and passionately devoted to the highest educational ideas and to the cause of southern education. As the representative of the Peabody fund and the Slater fund, he has done quite as much as Dr. Ruffner and Dr. Sears in shaping the southern educational movement.

From 1868 to 1897 the income of the fund amounted to $2,478,527.13, of which $248,562.25 was expended in maintaining the Normal College for whites at Nashville, Tenn., and $398,690.88 for scholarships at the same college. The remainder was expended in rendering aid to the needy public schools of the South and in stimulating normal and industrial education for both races.

In March 1882, John Fox Slater, of Norwich, Conn., created a trust fund of $1,000,000, stating that the "general object which I desire to have exclusively pursued is the uplifting of the lately emancipated population of the Southern States and their posterity by conferring on them the blessings of Christian education." He declared in the same relation: "The disabilities formerly suffered by these people and their singular patience and fidelity in the great crisis of the nation, establish a just claim on the sympathy and good will of humane and patriotic men. I cannot but feel the compassion that is due in view of their prevailing ignorance which exists by no fault of theirs."

"But it is not only for their own sakes," Mr. Slater said further, "but also for the safety of our common country, in which they have been invested with equal political rights, and I am desirous to aid in providing them with the means of such education as shall tend to make them good men and good citizens — education in which the instruction of the mind in the common branches of secular learning shall be associated with training in just notions of duty toward God and man in the light of the Holy Scriptures."

The fund is administered by a trustee board, and like the Peabody fund, composed of some of the most distinguished citizens of the republic. The Slater fund is used almost exclusively at the present time in promoting industrial education at a number of the largest institutions for colored people.

These princely donations by three private citizens, aggregating a fund of $4,000,000, have been supplemented by millions of dollars more from private citizens which have gone to the building up of the educational waste places of the South, to which all of the great church denominations have contributed, and still contribute, more or less as organized bodies. As the outgrowth of the benefactions and effort since 1865 there are now, according to Dr. Mayo, 169 schools of secondary and higher education in the Southern States maintained for the Negro people. They are fed constantly by the common schools. and all the agencies working together are fast reducing the ignorance bequeathed as a terrible legacy by the slave system to the Southern States. We shall search history in vain for a parallel to the munificence, the Christian charity and the personal sacrifice which the people of the great republic have contributed since 1865 to the education of the lately enslaved people of the Negro race.

It was natural and to have been expected, after the New England men and women who had graduated out of the white heat of the high educational enthusiasm created by Horace Mann, Henry Barnard, Dr. Sears, and others, from 1830 to 1860, had laid the foundation of the primary education among the emancipated people of the Southern States, that they would then turn their attention to the secondary and higher education of the same people. As fast as they prepared young men and women to take their places as school teachers (and at the present time there are more than 25,000 such teaching in the public schools of the South), these New England men and women retired from the field as public school teachers. They were actuated almost wholly by Christian missionary spirit.

But there was another and a splendid work for them to do in laying the foundation of the secondary and higher education as the necessary supplement of the primary educational work. At the present time there are 169 such schools in the 16 Southern States and the District of Columbia. Some of them are magnificent seats of learning; such, for example, as Howard University, at Washington; Atlanta University, at Atlanta; Fisk University, at Nashville; Wiley University, at Marshall, Texas, and the like, so that the Southern State which has no such school of higher learning is poor indeed. And these schools were founded, for the most part, and are maintained in the main by northern philanthropy — a philanthropy of which George Peabody, John F. Slater and Daniel Hand are the most striking examples. The fact that the income of these 169 schools in 1896–7 was $1,045,289, that $540,097 of it was derived from unclassified sources, that the several States and municipalities contributed $271,839, and that the students paid in tuition fees $141,262, shows that all the best forces of the republic — the State, the Christian philanthropist and the grateful beneficiary — are all working harmoniously together to prepare the children of the former slaves for the proper and high duties of citizenship. The public school system,— with 1,460,084 pupils enrolled of Negroes, in 1896–7, as against an enrolment of only 571,506 in 1876–7,— is a fixture and serves as a constant feeder of the 169 schools of higher learning. Thus the whole system, it will be seen, of primary, secondary and higher education, is in harmonious relationship and must grow stronger every year.

It should not be overlooked, however, that besides the splendid advantages offered the Negroes by these 169 schools of higher learning, all of the colleges and universities of the Northern and Western States are accessible to Negro students who prefer them, color distinctions not being recognized or tolerated in the management of these schools. The white colleges and universities of the Southern States, like the public school system, are conducted rigidly upon lines of race separation.

It was a natural development of the educational effort in the Southern States that when the schools of secondary and higher education had become fixed facts a desire should have grown up for other institutions whose principal object should be the industrial education of such of the Negroes as desire that sort of education. Of late years industrial schools have sprung up all over the Southern States, and they are growing constantly in favor with the masses, because of their economic condition and the growing demand for skilled workmen in all avenues of industry. In the early days of the educational work of the Southern States little stress was laid upon the industrial training of the people. Mental and moral and religious training was considered the all-important thing. Perhaps it was, — to a people who had dwelt in mental, moral and religious darkness from 1620 to 1865. They needed the great light of mental, moral and religious truths as a firm and sure foundation upon which was to be built a structure of technical education, out of which should naturally grow the industrial and commercial rehabilitation of the people, without which there can be no character, no strength, no prosperity in an individual or a race. This principle was recognized by the 30 members of the Society of Friends, who established the Institute for Colored Youth at Philadelphia in 1837.

The Friends were very much in advance of their time, and a great many good people of both races have not caught up with their idea as yet. However, there has been a very great and satisfactory awakening all over the republic during the past decade, among all races of the population, as to the vital importance of technical education. The fact that 13,581 Negro students were receiving industrial training in schools of the South, in 1897, speaks volumes, as compared to the 2,108 who were receiving collegiate education, and the 2,410 who were receiving classical instruction, and the 1,311 who were taking the professional course in the same year; making a total of 5,829 taking the higher education, or 7,752 fewer than were taking the industrial course. Indeed, the growth of the industrial theory of education among Negroes in the past decade has not only been phenomenal, but it is by all odds the most encouraging fact in a situation not without its discouraging features.

It is a rare compliment to one of the wisest and best of the New England men who engaged in the southern educational work that his theory of industrial training has taken such a firm root in a rich soil. This good and wise man was General Samuel Chapman Armstrong. While other men and women were devoting themselves to the necessary work of founding schools of secondary and higher education for the freed people, General Armstrong in 1868 busied himself in founding and developing the Hampton Normal and Agricultural Institute at Hampton, Va., which, says the historian of the work, "beginning in 1868 with two teachers and 15 students in the old barracks left by the Civil War, the Hampton school has grown, until at the beginning of 1899 there were 1,000 students. Of these 135 are Indians, representing 10 States and Territories. Of the 80 officers, teachers and assistants, about one half are in the industrial departments. Instead of the old barracks there are now 55 buildings."

The Hampton Normal and Agricultural Institute is without doubt at the present time the centre of all that is best, wisest and most permanent in the educational development of the black man in the South. It is by far the largest and most important seat of learning in the country for the development of the Negro. It has a large property now valued at over $500,000 and has in constant operation all the industries by which the colored people find it necessary to make a living. Under wise supervision this institution is constantly growing, broadening and deepening its influence among the people. The work of the Hampton Institute has not only resulted in turning the attention of the Negro population to the importance of industrial education, but has had a marked influence in shaping the education of the white South in the same direction.

Out of the Hampton Institute grew the Tuskegee Normal and Industrial Institute, located at Tuskegee, Ala., in the black belt of the South. The Tuskegee Institute has grown from a log cabin to an institution possessing at the present time (1904) 62 buildings with 2,325 acres of land, 151 instructors and over 1,500 students. It gives instruction in about 36 different industries, in addition to giving training in academic and religious branches. A large number of graduates of Tuskegee are turned out every year and are at work in various portions of the South as teachers in class rooms, instructors in agricultural, mechanical and domestic pursuits. Quite a number of these graduates and students cultivate their own farms or man their own industrial establishments. The property owned by the Tuskegee Normal and Industrial Institute is valued at $700,000, and the buildings have been very largely built by the labor of the students themselves. One rather unique feature of the Tuskegee Normal and Industrial Institute is that the institution is wholly officered by members of the Negro race. Aside from Hampton, Tuskegee is one of the largest and most important centres of education in the South, especially in the direction of industrial development.

The work of the Hampton Institute and Tuskegee is not only proving itself valuable in showing the rank and file of the colored people how to lift themselves up, but it is equally important in winning the friendship and co-operation of the southern white people. The influence of the young men and women turned out from these two institutions, as well as from other institutions, is gradually softening the prejudice against the education of the Negro, and in many striking instances bringing about the active co-operation and help of the southern white man in the direction of elevating the Negro to a higher plane of living.

There have been many other schools than the Tuskegee Institute founded on the Hampton idea, and the number is increasing every year. Nearly all the Southern States are now maintaining industrial schools not only for the blacks but for the whites as well, for the education that is good and necessary for the black is equally so for the white boy.

From these facts and conclusions set forth, hastily withal, it will readily be seen that from the educational point of view the Negro race has, since 1865, taken full advantage of its splendid opportunities, and that the present affords splendid promise that the future, which so many dread, will, in the providence of God, take care of itself. BOOKER T. WASHINGTON,

President Tuskegee Institute.

Negro Exodus, in American history, a term applied to the emigration of southern negroes to the West and Southwest in 1879 and 1880. During these years upward of 50,000 negroes, men, women, and children, moved to Kansas, and as many more were scattered among the other Western States. So many of the emigrants were penniless and destitute that a Freedmen's Relief Association was organized among the citizens of Kansas. The movement proved so disastrous that emigration ceased at the close of 1880. The negroes undoubtedly removed to the West to better their condition, but the charge was openly made that the movement originated with the Republican party, in order to ensure the election of Republican presidential electors in doubtful States.

Negro Free State. See LIBERIA.

Negro in America, The. In 1900 there were in the United States and its dependencies, 8,840,789 persons of negro descent. They were descendants of the slaves brought from Africa to America in the 15th, 16th, 17th, 18th, and 19th centuries. The demand for workmen in the mines and on the plantations of the Spanish West Indies was the primary incentive for opening the African slave trade to America. A small European slave trade from Africa had begun with the voyage of the Portuguese sailor, Antonio Gonzales, to the River of Gold in 1442. This stream was soon turned toward America when the Indians failed as workmen and the trade was encouraged by King Ferdinand and the Emperor Charles V. The Bull of Demarcation having debarred Spain from African possessions, she was compelled to secure her slaves through contract with the Portuguese and later with other trading nations. This contract for supplying the Spanish Indies with negroes became to be a great commercial prize and the zeal with which the Portuguese, Dutch, and Engglish successively filled these contracts was the main means of transplanting this race.

Early Immigration.— The exact number of negroes brought to America will of course never be known. Dunbar estimates that nearly 900,000 came to America in the 16th century, 2,750,000 in the 17th, 7,000,000 in the 18th, and over 4,000,000 in the 19th, less than 15,000,000 in all. In the limits of the United States, the growth of the black population has been steady and has even since the cessation of the slave trade far outstripped that of any other of the original groups of Americans. In colonial times the slaves went mainly to the West Indies, and, although a few landed in Virginia as early as 1619, they were not brought to the continent in large numbers until England secured the Spanish contract in 1713. At that time there were perhaps 50,000 negroes in continental America; by 1727 this had reached 75,000, and the subsequent increase is estimated by Bancroft as follows:

1750	220,000
1754	260,000
1760	310,000
1770	462,000
1780	462,000

Exact statistics as given by the census reports beginning in 1790 show the following figures:

DATE	Total negroes	Per cent of increase	Per cent of increase of whites	Per cent of total population
1790	757,208	....	....	19.27
1800	1,002,037	32.33	35.76	18.88
1810	1,377,808	37.50	36.12	19.03
1820	1,771,656	28.59	34.12	18.39
1830	2,328,642	31.44	34.03	18.10
1840	2,873,648	23.40	34.72	16.84
1850	3,638,808	26.63	37.74	15.69
1860	4,441,830	22.07	37.69	14.13
1870	4,880,009	9.86	24.76	12.66
1880	6,580,793	34.85	29.22	13.12
1890	7,488,789	13.79	26.68	11.93
1900	8,840,789	18.1	21.4	11.6

The census of 1870 was defective and probably that of 1890, also, which would explain the chief irregularities in the rate of increase of negroes. The higher rate of increase of the whites is due to the large immigration.

History.— The history of the negro in America up until 1863 is largely the history of slavery (q.v.). And yet he was not altogether the passive victim of the system. In the earlier days, the tendency was to recognize him as a kind of feudal serf not essentially different from the white serfs. Consequently, when freed, the free black had in many cases the right to vote and intermarried with the white servant class. Gradually, however, a color caste arose which condemned a person of negro descent to civil and legal inferiority, no matter whether he was technically a slave or not. The negroes did not submit to slavery or caste restrictions wholly without a struggle. Before 1850, while the fire of African freedom still burned in the veins of the slaves, there was in all leadership or attempted leadership but the one motive of revolt and revenge,— typified in the terrible Maroons, the Danish blacks, and Cato of Stono, and veiling all the Americas in fear of insurrection. The liberalizing tendencies of the latter half of the 18th century brought, along with kindlier relations between black and white, thoughts of ultimate adjustment and assimilation. Such aspiration was especially voiced in the earnest songs of Phillis, in the martyrdom of Attucks, the fighting of Salem and Poor at Bunker Hill, the intellectual accomplishments of Banneker and Derham, and the political demands of the Cuffes. Stern financial and social stress after the Revolutionary War cooled much of the previous humanitarian ardor. The disappointment and impatience of the negroes at the persistence of slavery and serfdom voiced itself in two movements. The slaves in the South, aroused undoubtedly by vague rumors of the Haitian revolt, made three considerable attempts at insurrection,— in 1800 under Gabriel in Virginia, in 1822 under Vesey in Carolina, and in 1831 again in Virginia under Nat Turner. In the free States, on the other hand, a new and curious attempt at self-development was made. In Philadelphia and New York color-proscription led to a withdrawal of negro communicants from white churches and the formation of a peculiar socio-religious institution among the negroes known as the African Church,— an organization still living and controlling in its various branches over a million of men.

Walker's wild appeal against the trend of the times showed how the world was changing after the coming of the cotton-gin. In 1830, slavery seemed hopelessly fastened on the South, and the slaves thoroughly cowed into submission. The free negroes of the North, inspired by the mulatto immigrants from the West Indies, began to change the basis of their demands; they recognized the slavery of slaves, but insisted that they themselves were freemen, and sought assimilation and amalgamation with the nation on the same terms with other men. Thus, Forten and Purvis of Philadelphia, Shad of Wilmington, Du Bois of New Haven, Barbadoes of Boston, and others strove singly and together as men, they said, not as slaves; as “people of color,” not as “negroes.” The trend of the times, however, refused them recognition save in individual and exceptional cases, considered them as one with all the despised blacks, and they soon found themselves striving to keep even rights they formerly had of voting and working and moving as freemen. On the other hand it was impossible to suppress wholly the upward struggles of the free negro or even of the exceptionally gifted slaves. When the war with England broke out, negroes fought in the ranks; they helped man the victorious ships in the struggle of 1812, and finally in the Civil War turned the scale of victory for the North at a critical point. The number of free negroes was as follows:

1790	59,466
1800	108,435
1810	186,446
1820	233,634
1830	319,599
1840	386,293
1850	434,495
1860	448,070
1870	4,880,009

Barred out of the labor market by slavery on the one hand and color prejudice on the other, these negroes were in a desperate condition; and even in the free States “black laws” curtailed their civil rights. Nevertheless they struggled bravely. In 1830, they held their first national convention in Philadelphia, and began to agitate for civil rights and education, and to discuss schemes of migration to Canada and elsewhere. As the abolition movement grew it received substantial aid from free negroes; it was in a negro church in Boston that the American Anti-Slavery Society was formed, and the first subscribers to Garrison's ‘Liberator’ came from a Philadelphia negro, James Forten. Led by Remond, Nell, Wells-Brown, and Douglass, a new period of self-assertion and self-development dawned. To be sure, ultimate freedom and assimilation was the ideal before the leaders, but the assertion of the manhood rights of the negro by himself was the main reliance, and John Brown's raid was the extreme of its logic. After the war and emancipation, the great form of Frederick Douglass, the greatest of American negro leaders, still led the host. Self-assertion, especially in political lines, was the main programme, and behind Douglass came Elliot, Bruce, and Langston, and the Reconstruction politicians, and, less conspicuous but of great social significance, Alexander Crummell and Bishop Daniel Payne.

Civil Rights.— As a slave, the negro could be (1) sold or given away by his legal owners, (2) seized for debt, (3) separated from his family, (4) could own no property, (5) had no right to vote, (6) could not hold office, (7) nor could he testify in a court of law save in suits for his own freedom. (8) He could not legally marry, (9) nor trade or make contracts. (10) He could not move about without permission, (11) could be punished corporally and even killed by the master in some cases, and (12) was not permitted to learn to read and write. Being thus legally deprived of all essential rights of manhood, he was utterly defenseless before the aggressions of the unscrupulous even in matters of life and limb. Free negroes in slave States like Virginia and North Carolina were disfranchised early in the 18th century; later their right to testify in courts was taken away, then the right to hold any office, and finally legal pressure was brought to bear in the shape of vagrancy laws and curtailment of economic freedom so as to force them into slavery or drive them from the State.

The free negroes of the North were very generally subject to codes of “Black Laws” which varied from State to State. Those of Ohio as adopted and amended in 1804, 1807, 1824, and later, prohibited negroes from settling in the State unless they could show a certificate of freedom and give bonds guaranteeing good behavior and self-support; a negro was disqualified from testifying in court trials where a white person was a party or to serve as a juryman in any case; his children were excluded from the public school; finally he could not vote. Some States had less rigorous laws and tended to alleviate the position of the blacks; others tended toward greater restrictions.

When the Civil War came despite disclaimer and compromise, the negro was the central issue. The first pressing question was the treatment of fugitive slaves; Butler confiscated them as “contraband of war,” Fremont sought to free all slaves, and Halleck sought to catch and return them. Finally beginning at Port Royal, S. C., under Pierce and extending to Fortress Monroe, New Orleans, Vicksburg, Cairo and wherever these fugitives were massed, there grew up systems of controlled negro labor under the guardianship of government officials. General Banks, for instance, had 90,000 ex-slaves under him in Louisiana, with 50,000 laborers under his guidance and an annual budget of $100,000. He made out 4,000 pay rolls a year, registered the freedmen, inquired into and redressed all grievances, laid and collected taxes, and established a public school system. Colonel Eaton in Tennessee, General Saxton in South Carolina, and others had similar work in charge.

Meantime missionary and freedmen's aid societies began sending money, clothes, and teachers south, and there was a demand that the government take hold of this work, unify it and help make easier the transition of 4,000,000 persons from slavery to freedom. This was the genesis of the Freedmen's bureau. This “Bureau of Refugees, Freedmen and Abandoned Lands” was established as a part of the War Department by the Act of 1865 and was modified and extended by the Act of 1866; the larger part of its functions ceased in 1869. General O. O. Howard conducted this bureau and “scarcely any subject that has been legislated upon in civil society failed at one time or another to demand the action of this singular bureau.» The Bureau had in its period of greatest activity 900 officials scattered from Washington to Texas. Their work included (1) the relief of physical suffering caused by the war; (2) the overseeing of the beginnings of free labor; (3) the buying and selling of land for the freedmen; (4) the establishment of schools; (5) the payment of bounty money to negro soldiers; (6) the administration of justice between white and black in the Bureau courts.

The Bureau distributed 21,000,000 free rations in fifty months, treated 500,000 patients in 60 hospitals and asylums, transported 30,000 fugitives back to the plantations, and made many thousands of contracts for the new free laborer. Little was done in the matter of furnishing the freedmen with land as the confiscated plantations were restored under the amnesty measures; but aided by the «carpet-bag» governments and the missionary societies a system of common schools and higher institutions was founded and nearly six millions spent on it. The Bureau courts were not successful and the general attitude of the whites was bitterly hostile to the institution. Such was the work of the Freedmen's Bureau. To sum it up in brief, we may say: it set going a system of free labor; it established the black peasant proprietor, it secured the recognition of black freemen before courts of law: it helped to found the free public school in the South. On the other hand, it failed to establish good will between ex-masters and freedmen; to guard its work wholly from paternalistic methods that discouraged self-reliance; to make negroes landholders in any considerable numbers. Its successes were the result of hard work, supplemented by the aid of philanthropists and the eager striving of black men. Its failures were the result of bad local agents, inherent difficulties of the work, and national neglect. The Freedmen's Bureau expired by limitation in 1869, save its educational and bounty departments. The educational work came to an end in 1872, and General Howard's connection with the Bureau ceased at that time. The work of paying bounties was transferred to the adjutant-general's office, where it was continued three or four years longer.

The Freedmen's Bureau really ended in the 14th and 15th amendments to the Constitution (1868 and 1870) giving negroes the right of suffrage. The last efforts of Charles Sumner were given to the Civil Rights Act of 1875, which forbade the exclusion of negroes from public conveniences and places of entertainment on account of color. This was afterward declared an interference with the rights of the States by the Supreme Court, and therefore unconstitutional. The matter of civil rights of negroes is therefore to-day left to the States and has resulted in widespread discrimination in the former slave States. Whites and negroes are separated in schools, railway trains, hospitals, jails, and graveyards by law, and by custom in hotels, theatres, lectures, libraries and churches, and often in street cars and elevators. Beside this there is a tendency to limit all economic and social intercourse to the barest amount necessary among neighbors. Intermarriage is forbidden and the concubinage of black women though decreasing is still considerable; and while it is very difficult to secure the punishment of a white man who violates a black woman, the black man who is even accused of rape against a white woman is usually lynched before he has had a legal trial. These separating laws and centrifugal tendencies have gone beyond reason, and the better thought of the South realizes it. In the future it is probable that lynching will cease, and kindlier intercourse be cultivated.

Political Rights.— Free negroes voted in many of the colonies in early times when otherwise qualified, but later the privilege was taken away as in Virginia in 1723. In the free States they continued to vote, but later were restricted sometimes by special qualifications, as in New York in 1821, or by limiting of the suffrage to whites, as in Pennsylvania in 1838. The 14th amendment to the United States Constitution sought to penalize States which reduced the electorate, and the 15th amendment made discrimination on account of race and color in the qualification of voters illegal. These enactments were made necessary by the opposition of the South to the Freedmen's Bureau and the evident determination of the southern legislatures to re-enslave the freedmen to all intents and purposes by civil restrictions, vagrancy laws, and special legislation. The result of the amendments was to throw the government of the southern States largely in the hands of the freedmen during the years 1866–76. So sudden increase of the electorate in any community would mean a period of disturbance and difficulty, but with honest leadership the outcome might have been different. As it was, dishonest and self-seeking politicians from both North and South sought to use the ignorant negro voters for their own ends, and much extravagance and some misgovernment ensued. Nevertheless it has been truly said of these negro governments:

> They obeyed the Constitution of the United States, and annulled the bonds of States, counties, and cities, which had been issued to carry on the war of rebellion and maintain armies in the field against the Union. They instituted a public school system in a realm where public schools had been unknown. They opened the ballot box and jury box to thousands of white men who had been debarred from them by a lack of earthly possessions. They introduced home rule into the South. They abolished the whipping post, the branding iron, the stocks and other barbarous forms of punishment which had up to that time prevailed. They reduced capital felonies from about twenty to two or three. In an age of extravagance they were extravagant in the sums appropriated for public works. In all of that time no man's rights of person were invaded under the forms of law. Every Democrat's life, home, fireside and business were safe. No man obstructed any white man's way to the ballot box, interfered with his freedom of speech or boycotted him on account of his political faith.

And a negro legislator of that period in South Carolina said in defense of his race that the men who criticised the extravagance of the period between 1869 and 1873 failed to mention

> Those imperishable gifts bestowed upon South Carolina between 1873 and 1876 by negro legislators — the laws relative to finance, the building of penal and charitable institutions, and, greatest of all, the establishment of the public school system. Starting as infants in legislation in 1869, many wise measures were not thought of, many injudicious acts were passed. But in the administration of affairs for the next four years, having learned by experience the result of bad acts, we immediately passed reformatory laws touching every department of state, county, municipal and town governments. These enactments are today upon the statute books of South Carolina. They stand as living witnesses of the negro's fitness to vote and legislate upon the rights of mankind.

Nevertheless, by force and fraud the negro governments were overthrown about 1876, and from that time until the present the negro has been disfranchised either by physical compulsion or cheating at the polls or ingenious legislation. The effects of these methods were so unfortunate that there arose in the South about 1890 a movement to deprive the negro of his vote by legal enactment. This has been practically accomplished now in Mississippi, Louisiana, South Carolina, North Carolina, Alabama, and Virginia, and movements in that direction have been started in other States. The avowed objects of these constitutional amendments have been (*a*) To disfranchise no white voter; (*b*) To disfranchise as many negroes as possible. This has been accomplished by the following measures:

1. *Illiteracy.*— The voter must be able to read and write. (This discriminates against negroes because the negro public school system in the South is much poorer than that of the whites.)
2. *Property.*— The voter must own not less than $300 worth of taxable property and pay taxes on it. (This of course discriminates against a poverty-stricken race of freedmen who could not legally hold property prior to 1863, and who to-day suffer in economic competition by reason of their color and training.)
3. *Poll Tax.*— A voter must have paid his poll tax. (This is a source of discrimination only when it extends back for several years as in Virginia.)
4. *Occupation.*— A voter must have a regular occupation. (This is designed to shut out negro laborers, and is a source of discrimination because of the difficulty of proving its truth.)
5. *Army Service.*— Soldiers or their descendants may vote. (Thoroughly vicious like the preceding.)
6. *Character.*—Persons of "good character" who "understand the duties of citizenship may vote." (This is a source of much discrimination and puts too much power in the hands of registrars.)
7. "*Grandfather*" *Clause.*— Persons who could vote 1 Jan. 1867 or their descendants may vote if registered within a limited time. (This is a thoroughly vicious attempt to admit ignorant white voters when the same class of blacks are barred.)
8. "*Understanding*" *Clause.*— Persons may vote who "understand" a clause of the Constitution and can explain it when read to them. (Another indefensible provision designed to shut out blacks arbitrarily by placing large powers of discretion in the hands of local registrars.)

Thus far States have adopted the above qualifications as follows:

Mississippi.— The literacy (1) qualification *or* the "understanding" clause (8) together with the poll tax (3) provision.

Alabama.— The army service (5) and character (6) clauses for persons registering prior to 1903; thereafter the literacy clause (1) and occupation clause (4), *or* the property qualification (2).

South Carolina.— For those registering before 1898, the literacy clause (1) except that writing is not required, *or* the understanding clause (8); after 1898 the literacy (1) *or* property (2) qualifications.

Louisiana.— Literacy (1) *or* property (2) clauses, in addition to the "grandfather" clause (7) which originated here.

North Carolina.— Literacy (1) *and* Poll tax (3) provisions, and "grandfather" clause.

Virginia.— For those registering before 1904, army service (5) *or* Property clauses (2); or literacy (1) *and* understanding clauses (8). After 1904, poll tax clause (3) providing the tax has been paid for three years, and literacy clause (1). Army service (5) excuses from the poll tax (3).

Other Southern States will probably adopt some of these expedients. Just what the ultimate results of these enactments will be is questionable. Probably the more flagrant provisions are unconstitutional and will be declared so eventually. If the negroes progress in the future as hitherto they cannot permanently be deprived of the suffrage.

Economic Status.— The occupations of negroes according to the latest census report were as follows:

Per cent of total negroes in gainful occupations 41.1 per cent.

	Total per cent	Male per cent	Female per cent
Professions	1.1	0.2	0.9
Agriculture	57.2	63.4	44.0
Trade and transportation	4.7	6.8	0.2
Manufacture	5.6	7.0	2.8
Domestic and personal service	31.4	21.6	52.1

This shows that most of the freedmen's sons are farmers and servants as one would expect. Of 1,410,769 negro heads of families in 1890 264,288, or 18.89 per cent of all, owned the homes or farms they lived in; the corresponding figures for the American whites are 51.48 per cent; for Russian- and Polish-Americans 31.38 per cent; for Italians in America 14.51 per cent. In the larger cities (50,000 or more) 9.14 per cent of the negroes owned their homes. In 1900 the per cent of negro owners had risen to 21.8 per cent of all negro families, or 372,414. If we consider particularly negro farmers we find that in the country districts of the South emancipation has been but partial, and that the negro serf is still bound to the soil by peonage, plantation stores and a system of crop mortgages. Nevertheless negro farmers starting with almost nothing a generation ago own to-day 25.2 per cent of all the farms they cultivate, or 188,072 farms out of 746,717 farms, with a total acreage of over 12,000,000, and farm property worth nearly $250,000,000. The total value of the farm property owned and leased by negroes was in 1900, $499,943,734, of which $324,244,397 was represented by the land, $71,903,315 by the buildings, $18,859,757 by the farming tools, and $84,936,265 by the live stock. The average negro farm is worth $669 and contains 51.2 acres. Seventy per cent of the negro farms report cotton as the chief crop; these farms raise 4 million bales of cotton, 24 million pounds of rice, 9 million bushels of sweet potatoes, 88 million pounds of tobacco and 100 million bushels of corn.

Beside these independent farmers there are a vast number of negro laborers, who raise the crops on the farms of the white farmers. There were the following negroes in the designated trades:

Carpenters	22,318
Barbers	17,480
Saw-mill operatives	17,230
Miners	15,809
Tobacco factory employees	15,004
Blacksmiths	10,762
Brick-makers	10,521
Masons	9,647
Engineers and firemen	7,662
Dressmakers	7,479
Iron and steel workers	5,790
Shoemakers	5,065
Mill and factory operatives	5,050
Painters	4,396
Plasterers	4,006
Quarrymen	3,198
Coopers	2,648
Butchers	2,510
Wood-workers	1,375
Tailors	1,280
Stone cutters	1,279
Leather-curriers	1,099

It is anticipated that the census reports for 1910 will, when completed, show a still more favorable condition.

In trade negroes are but making a beginning and have about ten millions of dollars invested in small grocery stores, drug-stores, undertaking establishments, newspapers, restaurants, etc. The negroes in professions included in 1890 12,000 clergymen, 400 lawyers, 1,000 government officials, 800 physicians, and 25,000 teachers. The number of those in the civil service and the number of physicians has greatly increased in late years.

Social Condition.— The illiteracy of the negro population 10 years of age and over has decreased as follows:

	Per cent
1870	80
1880	70
1890	57.1
1900	44.5

Of the negro population of voting age (males 21 years and over) 47.4 per cent are illiterate. Negroes have graduated from college courses as follows:

Number of negro graduates from:	Negro Colleges	White Colleges
Before '76	137	75
'75–80	143	22
'80–85	250	31
'85–90	413	43
'90–95	465	66
'95–99	475	89
Class unknown	58	64
Total	1,941	390

In the parts of the United States where deaths are regularly registered the death-rate of negroes was 32.4 per 1,000 in 1890, and 30.2 in 1900. The corresponding figures in cities are 33.7 and 31.1. In neither case do these figures apply to those rural districts where the negro population is massed. The record for the dis-

STATISTICS OF NEGRO CHURCHES IN 1906

DENOMINATIONS	Organizations	Church edifices	Halls	Approximate seating capacity of churches	Value of church property	Communicants or members
Adventist	31	14	9	1,948	$10,274	634
Advent Christian Church	2	2	....	700	3,800	72
Seventh-day Adventist	29	12	9	1,248	6,474	562
Baptist	19,891	18,754	571	5,831,259	26,562,845	2,354,789
Baptist, Northern Convention	108	99	6	41,860	1,561,326	32,639
Baptist, National Convention	18,534	17,832	508	5,610,301	24,437,272	2,261,607
Free Baptist	197	173	5	43,850	186,130	10,876
Primitive Baptist	4	4	....	1,200	2,300	102
Primitive Baptists in America	797	497	44	94,223	296,539	35,076
United American Free Will Baptists	251	149	8	39,825	79,276	14,489
Christian Convention	92	89	1	26,969	69,505	4,276
Church of God and Saints of Christ	48	1	47	400	6,000	1,823
Churches of God in North America	15	5	8	905	5,500	329
Churches of the Living God	68	45	23	10,635	58,575	4,276
Christian Workers for Friendship	44	27	17	5,985	23,175	2,676
Apostolic Church	15	12	3	3,100	25,700	752
Church of Christ in God	9	6	3	1,550	9,700	848
Congregationalists	156	133	14	39,500	459,497	11,960
Disciples or Christians	170	137	24	34,320	185,215	11,233
Disciples of Christ	129	112	8	28,095	170,265	9,705
Churches of Christ	41	25	16	6,225	14,950	1,528
Free Christian Zion Church of Christ	15	12	....	845	2,750	1,835
Lutheran	7	7	....	1,200	15,000	239
General Council of the Church	1	1	....	300	5,000	15
Evangelical Synodical Conference	6	6	....	900	10,000	224
Methodist	15,317	14,472	523	4,269,852	25,771,262	1,182,131
Methodist-Episcopal	3,750	3,556	75	901,812	6,104,379	308,551
Union American Methodist Episcopal	77	60	16	16,046	170,150	4,347
African Methodist Episcopal	6,647	6,292	268	1,832,600	11,303,489	494,777
African Union Methodist Protestant	69	68	1	21,955	183,697	5,592
African Methodist Episcopal Zion	2,204	2,079	78	690,951	4,833,207	184,542
Methodist Protestant	64	52	4	10,125	62,651	2,612
Wesleyan Methodist Connection	22	14	2	3,600	21,000	1,258
Colored Methodist Episcopal	2,381	2,252	78	758,328	3,017,849	172,996
Reformed Zion Union Apostolic Churches	45	41	1	15,700	37,875	3,059
Reformed Methodist Union Episcopal	58	58	....	18,735	36,965	4,397
Moravian	2	1	1	300	8,000	351
Presbyterian	659	593	18	193,441	990,215	47,116
Presbyterian Church in the United States of America	417	363	17	113,701	752,387	27,799
Cumberland Presbyterian	1	1	....	200	1,000	50
Colored Cumberland Presbyterian	196	195	1	71,165	203,778	18,066
Presbyterian Church in the United States	44	33	....	8,075	32,850	1,183
Associate Reformed Synod	1	1	....	300	200	18
Protestant Episcopal	198	150	11	42,700	1,773,279	19,098
Reformed Church	2	....	2	....	....	59
Reformed Episcopal	38	36	2	6,948	28,287	2,252
Roman Catholic	36	34	2	12,640	678,480	38,235
United Brethren	10	6	4	1,350	3,100	277
Voluntary Missionary Society	3	3	....	1,325	2,400	425
Independent Churches	12	12	....	845	2,750	490
Totals	36,770	34,506	1,261	10,481,738	$56,636,159	3,685,097

eases most fatal to negroes is as follows per 100,000 living:

	1890	1900
Consumption	546.11	490.6
Pneumonia	278.97	349.0
Diarrheal diseases	253.84	205.8
Heart disease and dropsy	203.99	216.6
Diseases of nervous system	332.9	294.6

Negroes have a smaller death-rate than the whites in scarlet fever, diphtheria and croup, cancer and tumor and diseases of the liver; about the same death-rate in measles and influenza, and considerably higher in malaria and typhoid fevers, diarrheal diseases, consumption, heart disease, pneumonia and diseases of the nervous system.

There were in the prisons of the nation in 1870, 1,642 negroes for every million of the negro population; in 1880, 2,480, and in 1890, 3,508. No later statistics are available. The increase of crime among whites was not so large as among negroes. This is due to the economic stress following emancipation, to discrimination in the courts in the South, and to the fact that through the convict lease systems of the South crime is a source of profit to the State and consequently little is done to curtail it effectively. There is beginning now a movement toward reformatories for the young in the South. The home life of negroes has greatly improved since emancipation. In the country districts about half the population still live in the one-room cabin which used to be almost universal, one third live in two-room homes, and the rest in homes of three or more rooms. The food has an excess of fats, but is improving. The chastity of the women which was made a by-word under the slave regime has taken great strides, so that even in the back country districts not above 9 per cent of the population may be classed as distinctly lewd; and in the cities and the better rural districts the negro women have shown distinctive results of the efforts made for their moral improvement. There still remains, however, a great work of uplift among the masses. The habitat of the negro population shows many changes in the last generation: First, it is segregating itself in a black belt extending from Carolina to Texas, and centring in the Mississippi bottoms; secondly, it is seeking northern cities; thirdly, it is beginning to move to the cities and towns of the South; 4.2 per cent of the negroes were in cities of 8,000 or more in 1860; 12 per cent in 1890.

Religion.— The statistics of negro churches in 1890 are given in tables on preceding page.

Amalgamation of Blood.— The negroes of America are not of pure negro blood. There has gone on in the country first an intermingling of the various African tribes transported and secondly a large infusion of white blood. The census reports of this latter intermingling are admittedly far below the truth:

1850— 405,751 mulattoes or 11.2% of all negroes.
1860— 588,352 " " 13.2% " "
1870— 585,601 " " 12. % " "
1890—1,132,060 " " 15.2% " "

As a matter of fact, probably a third of the negroes of the United States, or 3 millions, have traces of white blood.

Literature and Art.— The distinctive writings which reflect the life and feeling of American negroes can be found in their works as follows:

1773—Phillis Wheatley: Poem London.

1793—Richard Allen: Life. Philadelphia, 8vo. 60 pp.

1808—African Society: Essay on Freedom. Boston, 22 pp.

1810—Act of Incorporation, Causes and Motives of the African Episcopal Church. Philadelphia.

1812—Paul Cuffe: Brief Account . . . of Sierra Leone. N. Y., 12 pp.

1829—David Walker: An Appeal, etc. Boston.

1838—Appeal of 40,000 Colored Citizens. Philadelphia.

1852—M. R. Delaney: Condition . . of the Colored People. Philadelphia. W. C. Nell: Services of Colored Americans in the Wars of 1776, 1812. Boston.

1854—F. E. W. Harper: Miscellaneous Poems. Boston.

1855—Frederick Douglass: My Bondage and Freedom. New York, 464 pp.

1862—William Douglass: Annals of St. Thomas. Philadelphia.

1863—W. W. Brown: The Black Man. New York, 310 pp.

1867—B. T. Tanner: Apology for African Methodism. Philadelphia, 468 pp.

1875—Sojourner Truth: Narrative. Boston, 320 pp.

1878—J. M. Trotter: Music and Some Highly Musical People. Boston, 505 pp.

1881—W. S. Scarborough: First Greek Lessons. New York, 150 pp.

1882—G. W. Williams: History of the Negro Race in America. New York, 1882.

1883—J. M. Langston: Freedom and Citizenship. Washington, 286 pp.

1883—W. Still: Underground Railroad. Philadelphia, 780 pp.

1884—T. T. Fortune: White and Black. New York, 310 pp.

1885—D. A. Payne: Domestic Education. Cincinnati, 184 pp.

1887—W. J. Simmons: Men of Mark.

1890–1900—A. J. Cooper: Voice From the South. Xenia, O., 304 pp. W. H. Crogman: Talks for the Times. Atlanta, 330 pp. A. Grimke: Charles Sumner. New York, 515 pp. P. L. Dunbar: Lyrics of Lowly Life. B. T. Washington: Up from Slavery. C. W. Chesnutt: The Marrow of Tradition. DuBois: Souls of Black Folk.

The one contribution of negroes to art is their plaintive and beautiful folk-songs, many collections of which have been made by Fisk University and Hampton Institute.

Notable Men.— The negro race in America has given birth to many men of more than average ability. Frederick Douglass was an orator who greatly helped the abolition cause; Phillis Wheatley wrote better than most writers of her day; Benjamin Banneker did some work in astronomy and helped lay out the city of Washington; Ira Aldridge gained a European reputation as an actor; George W. Williams wrote the best extant history of the negro in America; Lemuel Haynes, Alexander Crummell and Daniel Payne were clergymen of unimpeachable character and wide influence for good. Blanche K. Bruce was United States senator and register of the treasury.

References.— The history of the negro prior to emancipation will be found in the abundant literature of slavery. Official sources of information are the United States census reports, especially 1850–1900, and the bulletin of the United States Bureau of Labor. Next to these may be placed the serial publications of the American Negro Academy, of the trustees of the Slater Fund and of Atlanta University, and the studies of Johns Hopkins University. The more important single works are Williams' 'History,' Washington's 'Up from Slavery,' Payne's 'A. M. E. Church,' the essays by Cable on the negro question, Chestnutt's 'Marrow of Tradition,' Dunbar's poems, and various articles by Kelly Miller. Much of the more important work is in the periodicals, and may be traced through Poole's 'Index.'

Negro Melodies. In slavery days the Southern Negroes were noted for their field and cabin songs and dances. Many of their original plantation songs had been handed down from their African ancestors. The tunes while melodious had a range of a few notes, the major key predominating. Following the ancestral melodies came the tunes adapted from Baptist and Methodist hymns. After the war the Negro songs began to disappear and nondescript Afric-European melodies, which eventually developed into ragtime, became popular in both the North and South. This change was due to two causes; the desire of the freed slaves to throw aside all remembrance of slavery days, and to the wide-spread development of modern Negro minstrelsy.

Negro Minstrels, a species of musical entertainment of a quaint and simple kind, which originated among the Negroes of the southern United States, and was first made popular at public entertainments by E. P. Christy, the originator of the troupes of imitation Negro musicians. The words of the songs are generally in broken English, and the harmonies almost entirely limited to the chords of the tonic and dominant. The bones and banjo and tambourine are the chief accompanying instruments, but minstrel troupes are usually accompanied by orchestras. Their entertainments are not now exclusively musical, but may include amusing interludes, dramatic sketches, acrobatic, and similar performances. Among modern Negro minstrels in the United States the names of Haverly, Backus, Kersands, Emerson, Henry, Carncross, and West are familiar to the amusement loving public.

Negro Monkey, the name of several monkeys noted for the blackness of their coats; especially a large long-tailed East Indian and Malayan langur (*Semnopithecus maurus*), which is reddish when young.

Negro Plot, in American history, the name given to a local rebellion in New York city in 1741. On 18 March of that year a fire occurred in the chapel and barracks at Fort George at the Battery. It was generally believed to be accidental, but charges were set afloat that it arose from a plot by the negroes to burn the city. Eight other fires of a mysterious nature within a month strengthened this belief, and later one Mary Burton, a servant, furnished testimony implicating a number of sailors and Negroes. Twenty whites and over 160 Negro slaves were seized and imprisoned. Finally Mary Burton's accusations inculpated persons of such character that danger from that direction checked the investigation. It was charged that the Spanish were inciting plots among the Negroes through Roman Catholic priests. Four whites were hanged, 18 negroes hanged, and 13 burned at the stake.

Negro Population in the United States. The census reports show that in 1790 there were 757,000 colored people in the United States; in 1800 there were 1,002,000; in 1810, 1,378,000; in 1820, 1,772,000; in 1830, 2,329,000; in 1840, 2,874,000; in 1850, 3,639,000; in 1860, 4,442,000; in 1870, 4,880,000; in 1880, 6,581,000; in 1890, 7,470,000; in 1900, 8,840,789. In 1900, in the 11 Southern States which were banded together in the old Secession Confederacy, there were 7,132,617 negroes and 11,776,291 whites. Following are the statistics by States:

	Whites	Negroes
Alabama	1,001,152	827,307
Arkansas	944,580	366,856
Florida	297,333	230,730
Georgia	1,181,294	1,034,813
Louisiana	729,612	650,804
Mississippi	641,200	907,630
North Carolina	1,263,603	624,469
South Carolina	557,807	728,321
Tennessee	1,540,186	480,243
Texas	2,426,669	620,722
Virginia	1,192,855	660,722

Negro (nā'grō) **Rio.** See Rio Negro.

Negro Troops, the negro has proved a valiant soldier in the various American wars. A very few of them were employed in the Revolutionary War. Though a few generals made use of them in the first two years of the Civil War, and Congress authorized their employment at the Sea Islands, the first general provision for their enlistment was made in July 1863. After that they were employed in considerable numbers, and at times with great success. Soon after the Rebellion a Negro regiment, the Ninth Infantry, was organized as a part of the regular army corps and performed valuable service in the West in various engagements with the Indians. The Ninth also was conspicuous for bravery in the Spanish-American War, in the Cuban campaign, and later in the Philippines.

Negropont, nĕ'grō-pŏnt. See Eubœa.

Negros, nā'grōs, Philippines, an island lying southeast of Panay, west of Cebu, and northwest of Mindanao, bounded on the north by the Visayan Sea, and on the south by the Sulu Sea; length, 134 miles; greatest width, 33 miles; area, 4,839 square miles, with dependent islands 4,854 square miles. It is the fourth island in size of the archipelago.

Topography.— A central mountain range, which divides the island into two almost equal divisions, extends from the extreme northern point to Caladias, only 14 miles from the southern coast; the spurs from this range extending east and west form large valleys. Near the northern end of the range is the Canlaón volcano, also known as Malaspina, 8,192 feet in height; and in the southern summits of the Sierra Dumaguete are two mountain lakes, the larger five miles long, the smaller two miles. A few miles southeast of the larger lake are the hot springs of Mainit, and near the coast near Dáuén are several sulphur and thermal springs. There are no large rivers, but numerous small streams flowing through the valleys.

Industrial Resources.— The soil is fertile and the vegetable products abundant; they include chocolate of excellent quality, sugar, coffee, rice, tobacco, wheat, cotton, hemp, bago, etc. There are also valuable forests in the interior. Important deposits of coal are found in both eastern and western Negros, and indications of iron in the western part. The most important industry of the island is agriculture; the natives understand methods of irrigation, and use the numerous streams for this purpose; next in importance are the fisheries; turtle shells, sea cucumbers, and sea shells are also gathered. Sugar and sugar sacks are manufactured, hydraulic machinery being used in the production of the former; in the eastern part of the island cotton pillows are manufactured, which are used on steamers. A wagon road or trail follows the coast, but there are few roads extending far into the interior; there are only two defiles through the mountain range. All the important towns are on the seacoast, and most of the local trade is carried on by water.

People and Government.— The people of the coast are Visayans, and those of the mountains Panayanos; the chief language is Visayan. The island was occupied by United States troops in 1900, and operations were carried on against bands of outlaws and robbers. In 1899 a native constitutional convention was held at Bacólod, and a constitution framed and submitted to the United States authorities, this being the first attempt to institute civil government in the Philippines. A temporary government was proclaimed in July 1899, and in 1901 the Philippine Commission divided the island into two provinces, Negros Occidental (western), and Negros Oriental (eastern), and established civil government similar to that in other provinces. Pop. 372,010; Occidental, 231,512; Oriental, 140,498.

Negruzzi, nā-groot'sē, **Jacob,** Rumanian author, son of Konstantin Negruzzi (q.v.): b. Jassy 11 Jan. 1843. He published his father's complete works; was professor of commercial law at Jassy and after 1885 at Bucharest; founded in 1867 the periodical called ‹Convorbiri literare› for which he wrote verse, fiction, and prose idylls; and translated Schiller into Rumanian.

Negruzzi, Konstantin, Rumanian poet and author: b. Jassy 1809; d. there 1866. He studied in Jassy and Bessarabia, edited ‹Dacia Literaria› (1840) with Cogalniceanu and Alecsandri, was a leader in the Liberal party and a minister of Count Cusa, and wrote versions of Pushkin, Kantemir, and Hugo; ‹The Sins of Youth,› a volume in prose and verse; and the epics ‹Aprodul Parice› and ‹Lapusneanu.›

Negun'do, a genus of trees represented by the box-elder (q.v.). It was regarded by Gray as a genus of the soapberry family (*Sapindaceæ*), but more recently botanists have classed it with the maples (*Aceraceæ*). It is extensively cultivated in the western United States.

Ne'gus, a beverage made of wine, water, sugar, nutmeg, and lemon-juice; so called from Col. Francis Negus, the inventor, who lived in the time of Queen Anne. Negus is also the native title bestowed upon the sovereign of Abyssinia.

Nehalle'nia, in Scandinavian mythology, a deity who presides over commerce and navigation.

Nehantic Indians. See NARRAGANSETT INDIANS.

Nehemiah, nē-hē-mī'ạ, **Book of,** a part of the canonical scriptures which is thus called from the name of the chief personage mentioned in it. The Book of Ezra (q.v.) is so named from the same reason. Certain parts of the Book of Nehemiah we may suppose to have been written by him, as they are in the first person. This and the Book of Ezra originally formed one work as they still do in the Hebrew canon, though separated in modern Hebrew bibles. They are connected as historical narratives, Nehemiah forming the sequel to Ezra. Ezra arrived in Jerusalem in the 7th year of Artaxerxes, king of Persia, and we hear nothing of his doings, subsequent to the events attending his arrival, until 13 years later Nehemiah appears upon the scene and relates what is written in the present book. He was cupbearer to the king of Persia, and Artaxerxes noticed his sadness, for he was grieving over the condition of his countrymen in Judah. The king therefore gave him leave to return to Jerusalem as governor of the city; he was also furnished with certain materials for re-fortifying it. Then the Samaritans were filled with envy at the favor shown the Jews and the dignity conferred upon Nehemiah. Meanwhile the latter was earnestly pressing on the work of rebuilding the wall, and as the Ammonites and Arabians threatened to interrupt the operations, he armed the builders and in 52 days the walls and towers were completed. The machinations of his enemies kept him constantly on the alert, but safety was at length secured by putting trustworthy men in command of the walls and gates. About a week after the restoration of the fortifications in Jerusalem Ezra is introduced into the narrative as a scribe learned in the law. A great gathering of the tribes is held at which he recites the Law. Priests and Levites assist him by explaining what he reads and such interest is created that the assembly continues its session from morning till noon. The Feast of Tabernacles is afterward celebrated, and the Jews, «the seed of Israel,» dedicate themselves once more to a state of separateness from the heathen and to an observance of the ordinances of the Law. Then the walls were solemnly dedicated, and Nehemiah returned to Persia in the 32d year of Artaxerxes. When he subsequently returned to Jerusalem he found that the high priest had polluted the temple by assigning to the associate of the Samaritan governor a room within its precincts. Nehemiah cleared out and purified the chamber and the book closes in the midst of his zealous labors for the protection of pure temple worship. The Book of Nehemiah is a page from the post-exilic history of the Jews, as animated by a revivid interest in and care for the Scriptures and a renewed national life under the ordinances of the Law. Consult Sayce, ‹Introduction to Ezra, Nehemiah, and Esther› (1889); Reuss, ‹Geschichte der heiligen Schriften des Alten Testaments› (1890).

Neher, nā'hĕr, **Bernhard von,** German painter: b. Biberach, Würtemberg, 16 Jan. 1806; d. Stuttgart 17 Jan. 1886. He received his first instruction in art from Dannecker and Hetsch in Stuttgart, but was more especially indebted to Cornelius, under whose eye he painted in Munich. His student life was completed by a four years' residence in Rome, where he painted ‹The Raising of the Widow's Son at Nain,› now in the Public Gallery at Stuttgart. In 1832 he returned to Munich and applied himself to fresco painting and in 1836 was commissioned to decorate two rooms in the castle of the grand duke at Weimar with scenes from the poems of Schiller and Goethe. He became director of the Leipsic Academy of Painting in 1841; professor in the art school at Stuttgart in 1846; and director of the same in 1854. During his residence in the latter city he executed the large oil painting ‘The Taking Down from the Cross,’ now in the Stuttgart gallery; ‘The Crucifixion’ for the church at Ravensburg; and the small painting, ‘Spring,’ now in the royal palace; ‘The Sacrifice of Abraham’; ‘Christ Blessing the Little Children’; ‘Abraham Receiving the Angels’; and several portraits. He also drew ten large cartoons for reproduction in glass, six in the cathedral, three in the chapel of the ducal palace, and one in Saint Leonard's Chapel in the king's palace at Stuttgart.

Neher, Michael, German painter: b. Munich 31 March 1798; d. there 4 Dec. 1876. For three years he attended the Art Academy of his native place and subsequently worked as an assistant to the court-painter Klotz and the decorator Angelo Quaglio. In 1819 he visited Italy, where he applied himself to architectural landscape. He returned to Munich in 1825 and made a reputation by his paintings of different costumes, his landscapes, views of city squares, and architectural pictures. He also made copies of paintings by Rubens and Schwind for the castle of Hohenschwangau.

Nehlig, nā-lēg, **Victor,** French painter: b. Paris 1830. He came to the United States in 1856, after learning his art under Cogniet and Abel de Pujol, and opened a studio in New York, where he was made a member of the National Academy (1870). Since 1872 he has resided in Paris. He is a very successful painter of history and genre, and among his best known pictures are ‘The Bravo’ (1870); ‘Armorer of the Old Time’; ‘Gertrude of Wyoming’; ‘The Artist's Dream’; ‘The Cavalry Charge of Lieutenant Hidden’ (New York Historical Society); ‘Battle of Antietam’ (William Astor collection); etc.

Neide, nī'dė, **Emil,** German painter: b. Königsberg, East Prussia, 28 Dec. 1843. He was educated at the local art school, but studied also at Düsseldorf and Munich, where he became especially an imitator and follower of Diez. His student travels took him through Belgium, Holland, and northern Italy. He subsequently settled at Königsberg. He had executed before making his tour a fresco in the hall of the local University, ‘Ptolemy Observing the Course of the Stars.’ On his return to Königsberg he followed this up by a series of mythological paintings, among which the most remarkable were ‘Psyche Ferried over the Styx by Charon’ (1873, in the Museum at Königsberg); ‘Orpheus and Eurydice’ (1876, in the Halsey collection, New York); and scenes from the Odyssey, for the Gymnasium at Insterburg. In 1886 he produced two genre pictures which showed a complete change in style, coloring, and handling as well as choice of subject, from what had characterized his work hitherto. These are ‘The Scene of the Deed’ (the discovery of the corpse of a murdered man); and ‘Life-Weariness,’ works which have greatly extended the popularity of their author, and have been excelled by none of his subsequent productions. He is professor in the art academy at Königsberg.

Neidhart von Reuenthal, nīt'härt fōn roi'-ĕn-täl, German poet of the 13th century. A Bavarian and a poor noble by birth he is famous for his peasant lyrics, satiric and unflattering in tone, which created a new style of “court-poetry.” Neidhart was a favorite of Frederick the Quarrelsome (after breaking with Leopold VII. of Austria), with whom he went on the Egyptian crusade of 1218–9. He died between 1240 and 1245, heartily hated by the peasants he portrayed, who styled him Neidhart Fuchs. His poems were edited by Haupt (1858).

Neilgherry (nēl-gĕr'ē) **Hills.** See NILGIRI HILLS.

Neill, Charles P., American educator and statistician: b. Illinois, 1865. At an early date his parents moved to Texas and he found employment in a bank in Austin. He began his college studies at Notre Dame University, but later went to Georgetown University, whence he graduated in 1891 *summa cum laude*, the second student in 50 years to be so honored by that university. After graduating he returned to Notre Dame as instructor for three years, and then entered Johns Hopkins University, in Baltimore, for post-graduate work in economics and history, meanwhile teaching in the Catholic University at Washington. In 1897, Johns Hopkins conferred the degree of Ph.D. on him, and since then he has been the head of the department of economics in the Catholic University. He was assistant recorder for the Anthracite Coal Strike Commission under Carroll D. Wright, and recorder for the Alabama Coal Strike Commission under Judge Gray. He was vice-president of the Board of Charities and Corrections of the District of Columbia, and in March 1905 was appointed Commissioner of Labor by President Roosevelt.

Neill, nēl, **Edward Duffield,** American historian and educator: b. Philadelphia, 9 Aug. 1823; d. 26 Sept. 1893. He was graduated from Amherst in 1842, and later studied at the Andover Theological Seminary. In 1848, having entered the Presbyterian ministry, he was settled as pastor of the first Protestant Church established at Saint Paul, Minn. He served (1851–3) as superintendent of public instruction for that Territory, and as chancellor of the State University, 1858–61. As army and hospital chaplain he served in the Civil War from 1861 to 1864, then till 1869 was an assistant private secretary, first to President Lincoln, and afterward to President Johnson. In 1869 he was for a short time consul at Dublin. He was president of Macalester College, Saint Paul, 1873–84, and professor of history and literature there from the latter year until his death. His books include ‘History of Minnesota’ (1858); ‘Terra Mariæ,’ a history of early Maryland (1867); ‘English Colonization of America During the Seventeenth Century’ (1871); ‘Minnesota Explorers and Pioneers’ (1881); ‘Virginia Vetusta’ (1885); and ‘Virginia Carolorum’ (1886).

Neilson, nēl'sȯn, **James Beaumont,** Scottish inventor of the hot blast in manufacturing iron: b. Shettleston, near Glasgow, 22 June 1792; d. Queenshill, Kircudbrightshire, 18 Jan. 1865. His father was a millwright, too poor to give his son much education. The latter worked at engines as a boy, acquired a little money by marriage, and in Glasgow at 25 became foreman of the new gas-works, in connection with which he opened a library, reading-room, and lecture hall for the employees. His experiments with the hot blast date from about 1825; they were contrary to the theory of the ironmasters of the time who saw that the iron was more easily worked and better in winter and so attempted artificial refrigeration. The result, of course, was that no one would let Neilson use his blast furnace for a decisive test for a time. The method introduced (1828) by Neilson is thrice as cheap as the cold blast; hence the patent was constantly infringed and for 15 years he was involved in exhausting law-suits, which, with the exception of the great case against the Bairds of Gartsherrie, who refused to pay license for the hot blast, were mostly unsuccessful.

Neilson, Lilian Adelaide, English actress, whose real name was Elizabeth Ann Brown: b. Leeds 3 March 1848; d. Paris 15 Aug. 1880. She worked in a mill at Guiseley and then as a nurse maid, and, upon learning the story of her birth, ran away from her mother, an actress, and went to London. There she was a bar-maid; gave dramatic recitations from Shakespeare; and made her début in 1865 as Juliet, possibly her best role. She played for several years in London with great success due to her beauty, her girlish grace, splendid voice, and dramatic power; and appeared in New York in 1872, '74 '76, '79, and '80. Joseph Knight says of her: «As a tragedian she had no English rival during the last half of this century.» Her roles included Isabella, Julia, Rosalind, Beatrice, Lady Teazle, Amy Robsart in Andrew Halliday's 'Kenilworth,' and Rebecca in Halliday's 'Ivanhoe.'

Neilson, Samuel, Irish politician, leader of the United Irishmen: b. Ballyroney September 1761; d. Poughkeepsie, N. Y., 29 Aug. 1803. After marrying the daughter of a rich merchant he went into the woolen business in Belfast. His part in politics became increasingly engrossing and in 1791 he suggested the organization of the United Irish Society, which was very successful, thanks to Wolf Tone. To assist this enterprise Neilson became editor of the 'Northern Star,' of which he was sole proprietor in 1794, and which was suppressed in 1797 after his arrest for treason. He was released in February 1798, rearrested almost immediately, and was again released in 1802. During these years it is impossible to decide whether he was faithful to his parole to the government or to his oath to his fellow conspirators; but it seems likely he was false to both parties. He came to America in December 1802 and died in the next year. Consult: Madden, 'United Irishmen' (1842–6), and the 'Life' by Dornin (1804).

Neisse, nīs'sė, Germany, a town in the Prussian province of Silesia and the government of Oppeln, on a river of same name, 47 miles by rail southeast of Breslau. It is a place of considerable strength, surrounded by detached forts and other works; has some notable edifices, military and other important schools, and manufactures furniture, blankets, wire-netting, etc. Neisse was anciently the chief town of a principality, and residence of a prince-bishop. It came into the possession of Prussia in 1741, when, after a valiant defense, it was taken by Frederick II.

Neith, nē'ĭth, or **Neitha,** in Egyptian mythology, a goddess who was worshipped especially as a local divinity in Lower Egypt. By the Greeks she was identified with Athene. She often appears as the companion of Phtha, who, as local divinity of the old capital of Memphis, stood at the head of the pantheon of Lower Egypt; and on that account she is not unfrequently styled the great Mother of the Gods. Like all the great Egyptian goddesses, she was identified with Isis.

Nejd, or **Nejed.** See NEDJED.

Nek'en, in Scandinavian mythology, the evil spirit of the North, said to have had his home in the Arctic seas.

Nekrassoff, nĕk-rä'sŏf, **Nikolai Alexeievitch,** Russian poet: b. Podolia 4 Dec. 1821; d. St. Petersburg 8 Jan. 1888. He was educated in St. Petersburg, where he left the army for the University against his father's wishes and was disowned by his family. By teaching and writing he made a bare livelihood. In 1847 he succeeded Bielinsky as editor of the 'Contemporary,' which post he kept until 1866; and in 1868 became editor of the 'Annals of the Fatherland,' in which most of his poetry appeared. He bitterly attacked administrative abuse, notably in his long poem, 'Who Lives in Russia Happily?' showing the discontent and the suffering in all classes. His satiric attacks on the bureaucracy should be mentioned and the pathetic and powerful 'Last Songs' (1877).

Nélaton, nā-lä-tôṅ, **Auguste,** French physician and surgeon: b. 17 June 1807; d. Paris 21 Sept. 1873. He studied medicine at Paris under Dupuytren, and was graduated 1836. Soon after he was appointed hospital surgeon and private lecturer in the faculty of medicine in the University of Paris. In 1851 he was appointed professor of clinical surgery, an office which he held till 1867, when he retired. In 1868 he was raised to the dignity of senator. Nélaton was equally distinguished as a professor and as an operator, and invented «Nélaton's probe,» used in military surgery in locating bullets. His chief publication is his 'Eléments de Pathologie chirurgicale' (1844–60; 2d ed. 1868–85), a work of great value, in which several of his pupils took part.

Neleus, nē'lūs, in ancient Greek mythology, a son of Poseidon and twin brother of Pelias. He was exposed, but reared by a shepherd. He refused to purify Hercules after the murder of Iphitus, and Hercules in vengeance killed all his sons but Nestor. It is said that he revived the Olympian games.

Neligh, nē'lĭg, Neb., city, county-seat of Antelope County; on the Elkhorn River, and on the Fremont, E. & M. V. railroad; about 120 miles in direct line northwest of Lincoln, and 130 miles in direct line northwest of Omaha. It is in a fertile agricultural section in which corn and wheat are the chief farm products. Considerable attention is given to raising cattle and hogs. It is the seat of Gates Academy, under the auspices of the Congregational Church. Pop. (1890) 1,209; (1900) 1,135; (1910) 1.566.

Nell Gwynn. See GWYNN, ELEANOR.

Nellore, nĕ-lōr', or **Nellur,** nĕ-loor', India, a town, the capital of a district of Madras, on the Pennair River, eight miles from its mouth in the Bay of Bengal, and 109 miles by rail northwest of Madras city. Pop. (1901) 32,040. The district of Nellore, area 8,765 square miles, is famous for its breed of cattle. Pop. (1901) 1,497,796.

Nel'son, Aven, American botanist: b. Lee County, Iowa, 24 March 1859. He was graduated from the State Normal School at Kirksville, Mo., in 1883, and since 1887 has been professor of botany in the University of Wyoming. He has published 'The Trees of Wyoming and How to Know Them' (1899); 'Key to the Rocky Mountain Flora' (1902); etc.

Nelson, Cleland Kinloch, American Protestant Episcopal bishop: b. near Cobham, Va., 23 May 1852. He was graduated from St. John's College, Annapolis, Md., in 1872, studied theology at Berkeley Divinity School, Middletown, Conn., and was ordained to the priesthood in 1876. He was rector of the church of St. John the Baptist at Germantown, Philadelphia, 1876–82, and of the Church of the Nativity, South Bethlehem, Pa., 1882–92. In the year last named he was consecrated bishop of Georgia.

Nelson, Edward William, American naturalist: b. Manchester, N. H., 8 May 1855. He was graduated from the Cook County Normal School, Chicago, in 1875. He was engaged in scientific research in Alaska in 1877–81 and was a member of the Arctic expedition on the United States steamer Corwin in her search for the Jeannette in 1881. He accompanied the Death Valley expedition in 1890 and has spent much time in scientific explorations in Mexico. He has published: 'Birds of the Behring Sea and the Arctic Ocean' (1883); 'Squirrels of Mexico and South America' (1899); etc.

Nelson, Henry Loomis, American journalist: b. New York 5 Jan. 1846; d. there 29 Feb. 1908. After a course at Williams College, he studied law, was admitted to the bar in 1869, was Washington correspondent of the Boston *Post* in 1875–85, and editor of that journal in 1885–6. In 1894–8 he was editor-in-chief of 'Harper's Weekly,' and from 1902 professor of political science in Williams College. He published: 'Our Unjust Tariff Law' (1884); 'The Money We Need' (1896), etc.

Nelson, Horatio, 1st Viscount, English naval officer: b. Burnham-Thorpe, Norfolk, England, 29 Sept. 1758; d. on board the Victory at Trafalgar, 21 Oct. 1805. He entered the English navy at 12 (1770). Three years after he went on an Arctic expedition under Commodore Phipps and on his return (1777) was made a lieutenant. Two years later he was promoted to the rank of post-captain. He was then sent to Nicaragua in command of a man-of-war, and took Fort San Carlos, in the San Juan River. In 1781–2 he made another expedition into the North Sea, but returned to the West Indies in 1782 and, placed in command of the Boreas; he was kept on this duty for five years, accomplishing much good from his vigorous attempts to prevent smuggling between the United States and the British colonies. Nelson's indomitable spirit in insisting upon enforcing the Navigation Acts against all foreign nations brought him into conflict with his commander, Sir Richard Hughes, and made him unpopular in commercial circles; for a long time he was harassed with vexatious law-suits. He was, however, upheld by the British government. It was while on this station that Nelson met and married the widow of Dr. Josiah Nesbit (11 March 1787). Six months after his marriage he returned with his wife to England and was placed upon the retired list. It has been hinted that through jealousy undue influence was brought to bear upon the Admiralty to keep him from active service. At any rate he remained in obscurity until all officers were recalled into active service on the outbreak of the war with the French Republic in 1792.

The year 1793 saw the real beginning of Nelson's career. He had attracted Lord Hood's attention, and at his solicitation was placed in command of the ship Agamemnon, 64 guns, and sent to join Lord Hood in the Mediterranean, where he rendered him valuable assistance at the siege of Bastia (May 1794). He participated in the siege of Calvi and there had the misfortune to lose one of his eyes. While on this station he also served under Hotham and Sir John Jervis. While on a diplomatic mission to Naples in September 1793 he met Lady Emma Hamilton, who was destined to be so closely identified with an important part of his life. In 1796 he was promoted to be commodore and was given a new command. On 25 Sept. 1796 orders came ordering the abandonment of Corsica and the Mediterranean, and Nelson sorrowfully left the field. He was, however, shortly sent back to secure supplies which had been left on the island of Elba, and on returning passed through the whole Spanish fleet which had then joined the common cause of France. On the following day occurred the famous battle of Cape St. Vincent (q.v.), 14 Feb. 1797. For his gallantry and skill in maneuvering his vessel he was made rear-admiral of the blue and appointed to the command of the inner squadron at the blockade of Cadiz. His next service was an attack on the town of Santa Cruz, in the Island of Teneriffe, in which he suffered the loss of his right arm. The wound refused to heal and he was obliged to return to England. He was decorated with the Order of the Bath by George III. and at the same time awarded a pension of $5,000. On the 29th of March 1798 he again set sail and joined the Earl of Saint Vincent (Admiral Jervis) off Cadiz 30 April. The admiral sent him to watch the progress of the armament at Toulon. Notwithstanding his vigilance, the French fleet which conveyed Bonaparte to Egypt escaped. Thither Nelson followed, and discovered the enemy's fleet moored in the Bay of Aboukir, where he obtained a complete victory, all the French ships but two being taken or destroyed (1 Aug. 1798). This achievement was rewarded with the title of Baron Nelson of the Nile and an additional pension of $10,000. Nelson set sail from Alexandria 19 August and arrived at Naples 22 September. Here began the pitiable period of his career, which left an indelible blot upon his otherwise unblemished name. He came under the influence of Lady Hamilton, wife of the English ambassador. His criminal relations with that lady, with whom he lived openly after the death of her husband, led to his ultimate separation from his devoted wife. Her influence can be recognized in many of his public acts during the two years he spent under her spell in Naples. During this time he seemed to fall into a lethargy which for the time being made him forget his duty to Great Britain, and at one time he practically acted in the capacity of admiral of the Neapolitan navy. He did, however, really get the Neapolitans to take up arms against the French, but their army was soon subdued and the Parthenopean Republic was established by Napoleon.

Finally Nelson seemed to awake to a new sense of duty, being goaded by the appointment of a junior officer, Sir Sidney Smith, to an important command in the Levant, and also aroused by the exciting news that Admiral Bruix had escaped with the French fleet from Brest and was about to enter the Mediterranean. The imminent danger of the French regaining the naval supremacy of the Mediterranean set Nelson to work with all his old time vigor. In the meantime Jervis had resigned his command and was succeeded by Keith, with whom he was at variance from the very start. He determined to take Naples before the possible arrival of the French, and forthwith appeared before that city 24 June 1799. Here he found Commodore Caraccioli in command of a Neapolitan squadron which was in league with the Republicans who were in complete control. The forts of the city surrendered on 26 June and then followed Nelson's worst mistake. The Neapolitan admiral was not captured till 29 June, but Nelson immediately ordered a court-martial and condemned him to death, thus violating the capitulation concluded 23 June. Caraccioli was cruelly hanged. The whole miserable affair has been attributed to the influence of Lady Hamilton, who was also the favorite of the queen of Naples. It was little honor to Nelson that the despicable king of Naples, Ferdinand IV., soon after this created him Duke of Bronte.

Nelson's flagrant disobedience of orders shortly after this is also ascribed to feminine influence. He obstinately remained at Naples when ordered to join Lord Keith, who expected to meet the French fleet. This meeting, as a matter of fact, never took place, but a great victory might have been won had Nelson's fleet put in an appearance in time. This affair had a great deal to do with his quarrels with Keith and also his subsequent orders recalling him to England. He arrived home 6 Nov. 1800, having traveled overland with the Hamiltons; soon after this the scandal of his life culminated in the final breach with his wife.

Nelson's promotion to the rank of vice-admiral was dated 1 Jan. 1801 and he was at once employed on an expedition to aid Sir Hyde Parker against the league of the Northern Confederation. This league by its policy of armed neutrality was really aiding the French Republic, and Nelson wished to strike first at Russia, but this policy was overridden, and Nelson contented himself with making a bold attack on the Danish fleet at Copenhagen. He completely annihilated the fleet and silenced the shore batteries 2 April. During the battle his attention was called to the fact that his ship had been signaled to cease firing. Placing a telescope to his blind eye he remarked: "I really cannot see the signal." This remark added to his popularity at home. For his success and gallantry upon this occasion he was created a viscount, and his honors were made hereditary in his family, even in the female line. He then took command of the squadron for defense against the contemplated French invasion of England and attacked the French flotilla off Boulogne 15 August. He then went back to Lady Hamilton in Merton, Surrey, and remained there during the Peace of Amiens. When hostilities recommenced after the Peace of Amiens, Lord Nelson was appointed to command the fleet in the Mediterranean, and for nearly two years was engaged in the blockade of Toulon. But in spite of his vigilance the French fleet got out of port (30 March 1805), and being joined by a Spanish squadron from Cadiz, sailed to the West Indies. The British admiral hastened to give chase and pursued them all the way to the West Indies and back again to Europe, one of the most exciting chases that ever took place in naval history. Villeneuve finally took refuge at Cadiz, but Nelson's object had been accomplished, for without his naval forces Napoleon could not carry out his plan of invasion and was now obliged to turn his attention to Austria, which had in the meantime declared war. Nelson now had Villeneuve in a trap, but hardly expected him to leave the harbor. The French admiral, however, learned that Napoleon was contemplating relieving him of his command because he would not fight. In despair, Villeneuve decided on desperate measures and the French and Spanish fleets sailed forth to meet the dreaded enemy, leaving the harbor 19 October, the French commanded by Villeneuve, the Spaniards by Gravina. On 21 October they came up with the British squadron off Cape Trafalgar. Then occurred the famous battle of Trafalgar, as desperate an engagement as ever took place upon the high seas. The engagement ended in a glorious victory for the British, but it cost them the greatest naval hero England ever produced. Nelson was mortally wounded early in the day and died during the afternoon. His remains were carried to England and he was buried with much pomp in St. Paul's Cathedral 8 Jan. 1806.

Consult: Southey, 'Life of Nelson' (1828); E. de Forgues, 'Histoire de Nelson' (1860); J. C. Jeaffreson, 'Lady Hamilton and Lord Nelson' (1888), 'The Queen of Naples and Lord Nelson' (1889); Laughton, 'Nelson' (1895); Mahan, 'Life of Nelson' (1899); Russell, 'Horatio Nelson' (1899).

Nelson, Samuel, American jurist: b. Hebron, N. Y., 10 Nov. 1792; d. Cooperstown, N. Y., 13 Dec. 1873. He was graduated from Middlebury College, Vt., in 1813, and in 1817 was admitted to the bar. He soon established a reputation which gained for him a large practice and in 1823-31 he was circuit judge. In 1831 he became associate justice of the supreme court of New York and in 1837-45 he was chief justice. He was appointed associate justice of the Supreme Court of the United States by President Tyler in 1845 and in the famous Dred Scott case he sustained Chief Justice Taney in his decision that if Congress had authority to destroy slavery it had also power to establish it. He disapproved the intrusion of military power in what he considered civil affairs, but maintained an unquestioned loyalty during the Civil War. He was appointed by President Grant a member of the Alabama Arbitration Committee in 1871, and in 1872 he resigned from the bench.

Nelson, Thomas, American patriot: b. Yorktown, Va., 26 Dec. 1738; d. in Hanover County, Va., 4 Jan. 1789. He was the son of William Nelson, governor of Virginia 1770–1, and was educated at Eton and Trinity College, Cambridge, England. Returning to Yorktown in 1761, he was elected to the House of Burgesses, in which he served for several terms; and he also sat in the Provincial Conventions, 1774–5–6, in the last of which he introduced the resolution instructing the Virginia delegates in the Continental Congress to move for a declaration of independence. Later (1775–7) he was himself a delegate to the Continental Congress, and was a signer of the Declaration. He resigned on account of impaired health, but was soon (August 1777) in command of the Virginia State forces, at whose head he remained until near the close of 1782. At the siege of Yorktown he ordered American gunners to fire upon his own mansion, in which Cornwallis was believed to have his headquarters. In 1779 he was again a member of Congress, and again resigned by reason of ill health. During the next year on his own security he raised public moneys for Virginia and paid certain military arrearages out of his private funds. In 1781 he became governor of the State, succeeding Thomas Jefferson, but in a few months resigned. His patriotic generosity had impoverished him, and he saw his property sold for payment of public debts contracted on the security he had given, while his own days ended in circumstances of privation.

Nelson, William, American sailor and soldier. b. Maysville, Ky., 1825; d. Louisville, Ky., 29 Sept. 1862. Entering the United States Navy in 1840 he became lieutenant in 1855 and at the opening of the Civil War was put in command of the gunboats on the Ohio, with rank of lieutenant-commander. On leaving the navy, soon after he entered the army, became a brigadier-general of volunteers and commanded the 2d division under Buell and the Battle of Shiloh. In a quarrel with the Federal general, Jefferson C. Davis, he was fatally shot at the Galt House in Louisville.

Nelson, Wolfred, Canadian physician: b. Montreal, Canada, 10 July 1792; d. there 17 June 1863. He was a surgeon in the British army in the War of 1812, but in 1837 he headed the rebellion decided upon in the meeting of the "Four Countries." He was captured and sentenced to imprisonment for life in the Bermudas, but the sentence was declared illegal and he was liberated. He lived in the United States in 1838–42, when he returned to Montreal and was twice chosen mayor of that city.

Nelson, Canada, town in Kootenay District, British Columbia; on the Kootenay River, 18 miles west of Kootenay Lake, and about 250 miles west of Vancouver. It is on a branch of the Canadian Pacific Railway. It is the centre of the noted Kootenay silver-mining region, and has large stamp-mills and smelters, a foundry, saw-mills, machine shops, and some smaller industries; banks, and daily, semi-weekly, and weekly newspapers. Pop. about 6,000.

Nelson, England, a town of Lancashire, about 3 miles northeast of Burnley, and 30 miles north of Manchester. Among its chief municipal features are a free library, technical school, large recreation ground, and market hall; it owns also its water, gas, and electric lighting plants. It is a thriving cotton manufacturing centre.

Nelson, a river in Canada, the largest in the Territory of Keewatin. It is an outlet of Lake Winnipeg; leaving the lake at the north end, it first flows north through several lakes to Split Lake, then northeast to Hudson Bay, which it enters through Port Nelson. The volume of water it discharges is very large; it is a deep, swift-flowing stream, with many rapids and cascades along its course of about 425 miles. It is navigable for boats to about 130 miles from its mouth, and for about 100 miles from Lake Winnipeg.

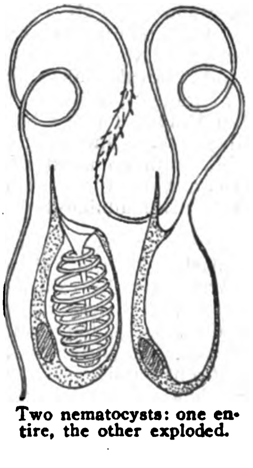
Nelson Fort, a former Revolutionary fort at Norfolk, Va., now the site of the United States Marine Hospital.

Nel'sonville, Ohio, city, in Athens County, on the Hocking River and on the Hocking Valley railroad; about 60 miles southeast of Columbus. It is in the vicinity of bituminous coal fields, and has a large trade in coal. Its chief manufacturing establishments are car wheel works, mining implement shops, foundry, and repair shops. The city owns and operates the waterworks. Pop. (1910) 6,082.

Nelum'bium, a genus of aquatic plants of the family *Nymphaceæ,* containing the East Indian lotus (*N. speciosum*) and the Egyptian lotus (*N. cævulea*). The former serves many useful purposes in the East. The filaments are there deemed astringent and cooling, and are prescribed in burns, piles, and menorrhagia; the seeds are given to prevent vomiting, and to children as diuretics and refrigerants. The large leaves are made into bed sheets for fever patients; a sherbet made from the plant is given as a refrigerant in smallpox, etc. The rhizome, stalks, and seeds are eaten by the Hindus, and furnish a preparation known in commerce as "Chinese arrowroot." A fibre derived from the stalk is used as a wick for lamps in Hindu temples, the plant being considered sacred. See LOTUS.

Nem"athelmin'thes, a phylum of worms. See table of classification under ANATOMY, COMPARATIVE; EEL-WORMS; ROUNDWORMS; THREAD-WORMS; etc.

Nematocysts (Greek *νημα,* thread, *κύστις,* bag, cell), peculiar cells occurring in the *Cœlenterata* (q.v.) and in a few members of other groups of animals (*Protozoa Turbellaria, Mollusca*) which serve as weapons of offense and defense. In structure a nematocyst is a cell one end of which is drawn out into a long tube, the thread, which is inverted into the body of the cell as the finger of a glove may be turned into the palm. Connected with the cell



Two nematocysts: one entire, the other exploded.

is a hair-like structure, the cnidocil, and when this is touched the nematocyst «explodes.» The thread is forced out, carrying with it the fluid contents of the cell, which in its physiological action is much like formic acid. This is sufficient to kill small animals, to paralyze those of larger size. Some Cœlenterates, like the Portuguese man-of-war, have nematocysts which can produce very disagreeable effects on man. Once exploded, a nematocyst cannot be used again. From their structure and action nematocysts are also known as thread cells, nettle cells, lasso cells, and cnidæ.

Nemato'da, a class of worms in the phylum *Nemathelminthes,* the thread-worms, having a very elongated cylindrical body pointed at both ends, clothed in a tough cuticle, and containing in the body-cavity a clear fluid. The enteric canal is straight, and consists of pharynx (a stomodæum), intestine and rectum; the mouth is anterior and terminal, the arms ventral and near the posterior end. Excretory canals running in the lateral lines are usually present. «The nervous system,» says Parker, «consists of a pharyngeal ring containing nerve-cells and giving off nerves forward and backward; of the latter a single ventral nerve-cord, or two cords, respectively dorsal and ventral, are of considerable size and extend to the posterior end of the body.» The nematodes are in nearly all cases diœcious, immense numbers of eggs being produced, and impregnated within the body of the female. The class is divided into two orders: (1) *Nematoidea,* the free-living nematodes and most parasitic forms in which the cœlom is not lined by epithelium, but is bounded directly by body-muscles; (2) *Gordioidea,* a small number of great elongated worms (see EEL-WORMS) which are parasitic in the asexual, free-living in the sexual stage. See THREADWORMS.

Nematog'nathi, a group of fishes, the cat-fish (q.v.).

Nematoph'yton, a genus of fossil algæ, preserved in the Devonian rocks of the eastern United States and Canada, the stems of which were often several inches in diameter. The best known species is *N. logani.*

Nemcová, nyĕm'tsō-vä, **Bozena** («BARBARA PANKL»), Czech poet: b. Vienna 4 Feb. 1820; d. Prague 21 Jan. 1862. Her reputation was made largely by the collections, 'National Tales and Legends' (1845–6), and 'Slovak Tales and Legends' (1858). Her 'Sebrané Spisy' ('Collected Works') appeared at Prague (with a biographical sketch by Podlipská). One of the best of her original stories from common life was published in a German version as 'Die Grossmutter' in Reclam's 'Universalbibliothek'.

Nemea, nē'mę-ạ, Greece, a classic valley of Argolis, the site now marked by the village of Nemea, due north of Argos, on the railroad to the Gulf of Corinth. The valley from north to south is from two to three miles long, and more than half a mile broad. It possessed a sacred grove, with a magnificent temple to Zeus, and here biennially were held the celebrated Nemean Games, one of the four great national athletic and musical festivals of the Greeks.

Nemean (nē'mę-an or nę-mē'ȧn) **Games,** in ancient Greece, public games or festivals were celebrated at Nemea, probably triennially. The Argives were the judges at these games, which comprised boxing and athletic contests, as well as chariot-races. The conquerors were crowned with olive.

Nemertin'ea, a class of *Platyhelminthes* (q.v.) of which a few are terrestrial and a few occur in fresh water, but the great majority are marine. As a rule they have a flattened body without any processes and covered on the outside with cilia. The mouth is on the ventral surface at the anterior end and the vent at the opposite end of the body. The alimentary canal is straight; in some with enlargements on either side at regular intervals. Above the alimentary canal is a peculiar proboscis which can be everted through an opening above the mouth, by means of which the animal captures its prey, which consists of other animals, largely of worms. There is no body-cavity, the body being solid from the intestine to the outer wall, except for the small tubes of the blood-vessels and excretory organs. The sense-organs are the usually present eyes, and also, in many, grooves upon the sides of the head which are usually regarded as organs of smell. The nervous system consists of a «brain» around the anterior part of the alimentary canal, from which three nerve cords (two lateral and one between the digestive tract and the proboscis sheath) run backward through the body. Some nemertines develop directly while others go through a complicated metamorphosis, in which part of the body is cast off. Most nemertines are small, but some reach respectable dimensions. One species on the New England coast can stretch itself to a length of 15 feet or retract itself to two. The largest species (*Lineus longissimus*) may extend to 90 feet.

Nemesianus, nē-mē-sĭ-ā'nŭs, **Marcus Aurelius Olympius,** Latin poet of the close of the 3d century B.C., probably a Carthaginian. He won much fame by his verse at the court of Numerianus, who alone surpassed him in composition; wrote on fishing ('Halieutica'), sailing ('Nautica'), and hunting ('Cynegetica'), only a part of the last poem being extant; and is supposed to be the author of four pastoral poems found in MSS. together with Calpurnius' eclogues, and hence formerly attributed to Calpurnius. The peculiar movement of these pastorals has suggested the theory that the 'Pervigilium Veneris' is by Nemesianus. All his extant works are edited by Bährens (1879); the 'Eclogæ' by Schenkl (1885); an English version of the latter by Scott appeared in 1891.

Nem'esis, in Greek mythology, the daughter of Erebus and Night. Other accounts make her the daughter of Zeus and Necessity, or of Ocean and Night. She is goddess of retribution, the tamer of the passions, the avenger, the enemy of pride and haughtiness; and she watches over the observance of the honors due to the dead, on which account a yearly festival in memory of the departed was called by the Greek Nemesia. Nemesis is represented under the figure of a majestic female clothed in a tunic. With the right hand she grasps a part of her garments over her breast; in her left hand she holds a cup. On coins she appears drawn in a car by dragons, sometimes wearing a mural crown, and rarely winged. The great number of coins and gems on which she is found proves her worship to have been extensive and popular.

Nemesius, nẹ-mē'sĭ-ŭs, Greek philosopher: b. in the first half of the 4th century A.D. He became bishop of Emesa in Syria, and has been remembered chiefly through his treatise on 'The Nature of Man,' which declares the freedom of the will, the supremacy of the spiritual powers, the indestructibility of matter. The book is thought to show some anticipations of the theory of the circulation of the blood. It has been translated into various modern languages.

Nemi, nā'mē, Italy, a classic lake about 18 miles south of Rome, filling the crater of an extinct volcano, the sides of which are formed partly of basalt and partly of consolidated scoriæ. The lake is 1,022 feet above the level of the sea, and has a circuit of five miles. Owing to its beauty, it is accounted the gem of the Alban Mountains, and was celebrated by the Latin poets under the name of Lacus Nemorensis or Speculum Dianæ — Diana's Mirror. On the northeast shore near the village of Nemi, a famous temple of Diana was situated, of which modern excavations have yielded interesting remains; remnants of rafts used in the festival services of Diana, and dating from the reign of Caligula, were also recovered from the bed of the lake in 1895.

Nemours, nė-moor, **Duc de** (Gaston de Foix). See Foix, Gaston de.

Nemours, Louis Charles Philippe Raphael d'Orleans, Duke of, French soldier, second son of King Louis Philippe: b. Paris 25 Oct. 1814; d. Versailles 26 June 1896. He entered the army in 1826; gained little by the Revolution of 1830, since he had been a favorite with Charles X., who intended to marry him to the daughter of the Duc de Berry; refused the crown of Belgium in 1831; served in the Belgian campaigns and in Algiers, where his bravery won him the grade of lieutenant-general in 1837; became heir apparent by the death of his brother, the Duke of Orleans, in 1842; but was so unpopular that he found it wise not to press his claims in 1848, but to remove to England. He returned to France in 1870, re-entered the army, from whose lists his name was struck by the anti-royalist measures of 1886, and spent his last years in retirement.

Nemours, France, a town in the department of Seine-et-Marne, 10 miles south of Fontainebleau. The old castle of Nemours, built in the 12th century, is memorable on account of the edict revoking the privileges of the Huguenots, signed here by Henry III., 7 July 1585. Pop. about 5,000.

Nemours, with the surrounding territory, was erected into a duchy in favor of the Count of Evreux in 1404. In 1507 Louis XII. bestowed the duchy upon his nephew Gaston de Foix, who was killed at the battle of Ravenna in 1512. From 1528 to 1689 the duchy was possessed by the house of Savoy. In 1689 it was purchased by Louis XIV., who bestowed it upon the Orleans family. King Louis Philippe gave his second son the title of Duke of Nemours, and the titular dignity is still borne by a branch of the Orleans family.

Nena (nä'nä) **Sahib.** See Nana Sahib.

Nennius, nĕn'ĭ-ŭs, British historian: b. in the latter part of the 8th century. He is said to have lived in Wales and to have been the author of the chronicle, 'Historia Britonum,' or 'Eulogium Britanniæ,' reaching down to the 8th century. The manuscript, written in Latin, is in the British Museum, and the work has been republished several times. The best editions are those of J. Stevenson (1838), and Mommsen, in 'Monumenta Germaniæ Historica,' etc. (1898). An English translation by W. Gunn was published in 1819. Ellis speaks of the work as that of «a credulous compiler, though, from the antiquity of his materials, valuable to an inquisitive historian.» His work gives the mythical account of the origin of the Britons, the Roman occupation, the settlement of the Saxons, and closes with the 12 victorious battles of King Arthur. The writer has preserved valuable fragments of earlier treatises which have been lost. The historical value of his work is not great, but in mythical and legendary matters it has a recognized importance. Consult Zimmer, 'Nennius Vindicatus' (1893).

Ne"o-Dar'winism. See Weismannism.

Neo-Hegelianism, the doctrine of a modern school of philosophy, which has representatives among English, Scottish and American thinkers. They profess their belief in an eternal consciousness, of which the universe is the object; basing their conviction on the theory that in the world of thought consciousness and object are correlatives, and mutually implicated; and that the existence of the physical universe was prior to that of finite consciousness, and this latter is in some way correlated with physiological organisms. The most prominent Neo-Hegelian in England was Green (see Green, Thomas Hill), who may be said to be the founder of English Neo-Hegelianism.

Neo-Kantianism, the teaching of those who accept Kant's theory of knowledge, but refuse to acknowledge the doctrine of practical reason as the best guide in working out a metaphysic. Among this school may be mentioned F. A. Lange and H. Cohen. See Kant, Immanuel.

Ne"o-Lamarck'ism, the doctrine held by a school of modern naturalists, mainly American, that the results of organic evolution are due mainly to the principles and factors formulated by Lamarck (q.v.) and expounded in the article Lamarckism (q.v.), and not mainly to natural selection as asserted by the Darwinians. The modification and expansion of Lamarck's theories, due to enlarged knowledge, constitutes Neo-Lamarckism,— a term first applied by Prof. A. S. Packard, who with E. D. Cope and Alpheus Hyatt, was among its foremost exponents.

Neo-Pla'tonism, the revival and mystical transformation of the Platonic philosophy, mainly through the speculations of non-Hellenic thinkers. The word has, however, two meanings. In the first and historic sense it denotes the metaphysical theories which prevailed during the whole of the third and last period of Greek philosophy; and these theories and their several schools are usually spoken of as three in number: (1) The Jewish-Greek philosophy; (2) Neo-Pythagoreanism (q.v.), and (3) Neo-Platonism proper. In its general sense, Neo-Platonism was a syncretism of Orientalism, Judaism, and Hellenism. The favorite subjects of discussion among Neo-Platonists were what they styled the dualistic opposition of the divine and the earthly; God as an abstract conception; contempt of the world of the senses; various theories of intermediate beings, half human, half divine; asceticism and the nature of enthusiasm as expounded by Hermes Trismegistus (q.v.) and the Christian Gnostics (q.v.). Near the Neo-Platonists stand Philo (q.v.), Aristobulus, the Essenes and Therapeutæ (q.v.).

Neo-Platonism in a narrower sense is the philosophy which originated with Plotinus and his school, and not with Ammonius Saccas, as an ancient tradition relates. Neo-Platonism was a last attempt made by Alexandrian thinkers to explain the dualism of appearance and reality. This attempt was made by a despairing leap beyond nature and reason; a solution was sought outside rationality, by a sort of intellectual suicide, and the attempts ended in the dreams of passive mysticism. It was taught that if we lose self-conscious thinking, the distinction between subject and object disappears, and if we reach *ecstacy,* we attain «union with God» and in that union all antinomies vanish. If by philosophy we understand rational thinking, Neo-Platonism must be considered a philosophical failure, and as the Neo-Platonist movement was not continued in new developments, it may well be said to represent the exhaustion and dissolution of ancient philosophy.

Its historical movement has three stages. In its first stage Neo-Platonism was essentially a «scientific» theory. Its main characteristic was the emphasis laid upon knowledge, the object of knowledge being God, and the aim of philosophy to conceive the divine essence immediately and with the innermost activity of the soul. In the second stage of Neo-Platonistic development appeared Iamblichus' (q.v.) systematic theology of polytheism, which distinguished what is usually called the Syrian phase of Neo-Platonism. This theology stood in strong opposition to Christianity. In its third stage Neo-Platonism lost its identity and under this name we are presented with a mere scholastic recapitulation, in a dialectic way, of the whole of classical philosophy. This scholastic and historic Neo-Platonism is represented by Proclus (q.v.) who reigned philosophically supreme at Athens until his school was closed by that edict of Emperor Justinian (q.v.) in 529 which was «the official certification of the death of ancient philosophy.» In almost all its stages Neo-Platonism was characterized by theurgy, magic and sorcery of all kinds, and Neo-Platonist teachers did not hesitate to call themselves hierophants and to make money by divination. In attempting to repair the ravages wrought in the Greek mind by a despairing Skepticism (q.v.) Plotinus propounded the theory that knowledge transcended reason; that the absolutely true could be comprehended immediately, and intuitionally, namely, by ecstacy. Such inner knowing was the beholding of «the One» in itself; and a resolving of self into the absolute. The subject could not, it was taught, master the absolute by objective knowledge or through the medium of dialectic.

The Godhead, «the First,» «the One,» «the Good,» is the original Being, incapable of definite characterization, wholly unspeakable and superior to all comparisons; it is «that which stands above being,» and is neither thinking, willing, nor desiring. The world emanates from out the Godhead by an eternal, timeless, and necessary process, without division of itself or loss of essence. The world, being an effluence or overflowing of the divine, is more or less perfect according to the degree of nearness to or remoteness from its source. Each degree of emanation, however, has for its principle the totality of being. Next to the original «One,» reason is the most perfect. It contains in itself the Ideal World and the whole of true and changeless being. Christian Neo-Platonists often identified the reason (*Nous*) of Plotinus with Logos, the second person of the Christian Trinity. That was a mistake. Logos with Plotinus is scarcely more than «law» regarded as «vital force» and in operation resembling instinct. The Johannean Logos is both immanent and transcendant. From reason emanates the World-soul, though reason incurs no change thereby. The World-soul actualizes reason in the outer world; it gives external qualities to sensible matter, which is the last and lowest of the emanations. Matter is itself undetermined, has no quality nor being. The visible universe is only a transcript of the World-soul. Plotinus does not concern himself much about the fact of the imperfections of individual things and the sin which exists in the world. As the World-soul links reason and matter, so do individual souls partake both of reason and sense. Mankind has a supersensible soul, which has pre-existed, and a lower soul which builds up the body. Souls came down from the rational or light-world, which is their real home and retain a recollection of it, hence their longings are always for a return. From these longings come our redemption and our prospective union with Divinity, and the degree of seriousness with which we realize them determines our worth as individuals. Pure sense-perceptions do not help the soul in its soaring which is rather promoted by thought and reflection. The strongest incentive and most potent force in the elevation of human nature is love of the beautiful, the Platonic ἔρως Neo-Platonism, together with Neo-Pythagoreanism, which had preceded it, represents an effort of paganism toward reform and reconstruction in order to meet the supernaturalism, monotheism, and universalism of the victorious Christianity which was everywhere pushing hard upon pagan thought and religion. In Iamblichus («the divine» or «the famous hero» as Emperor Julian (q.v.) called him) Neo-Platonism finds expressed its religion, and expressed not so much according to Plato as according to Pythagoras (q.v.). Iamblichus created a fantastic pantheon in order to bring the entire world of gods into a system, in which he co-ordinated all cults, excluding Christianity, which was feared as a rival; but this erudite religion failed to meet «the desire of the nations» or «the spirit of the times.» «Any old woman of the Christians,» said Augustine, sarcastically, «is wiser than these philosophers.»

Neo-Platonism, as represented by Proclus, made a last supreme effort to retain an authoritative position in the world of thought. Proclus attempted to systematize the entire historical content of Greek philosophical thought, and place it upon a coherent and logical basis, but the effort was fruitless. A few feeble echoes of this teaching are perceptible in the writings of some of the Church Fathers, as for instance, Clement and Origen. Subsequent phases of philosophic speculation bear sometimes the imprint of Neo-Platonism. Attempts were made by Ficinus (1433–99), a celebrated Italian scholar, by Pico della Mirandula and other Florentines for its restoration. The English «Cambridge Platonists» in the 17th century also tried to revive it. Thomas Taylor (q.v.) (1758–1835) may be called the last European Neo-Platonist.

Consult: Whittaker, 'The Neo-Platonists'; Bigg, 'Neo-Platonism'; Richter, 'Neu-Platonische Studien'; Kirchner, 'Philosophie des Plotin'; the larger Handbooks of Philosophy, such as those of Ueberweg, Windelband, and Zeller.

C. H. A. Bjerregaard,
Librarian, New York Public Library.

Neo-Pythagoreanism, a revived form of Pythagoreanism held in the 1st century B.C. at Alexandria. The author of this revival was Nigidius Figulus, a Roman magistrate; but Apollonius of Tyana (q.v.) was its most brilliant expounder. The latter was an opponent of Neo-Platonism (q.v.) and mixed the philosophy of numbers with certain modified forms of Oriental theosophy, and ascetic ideas. Consult: Zeller, 'Die Philosophie der Griechen' (1880–1); Vacherot, 'Histoire Critique de l'Ecole d'Alexandrie' (1846–51).

Ne'ocene, in geology, a term used by the U. S. Geological Survey to include what Lyell called the Miocene and Pliocene periods. The word means «new (or late) recent,» and is contrasted with Eocene, «dawn (or early) recent.» See Tertiary.

Neoco'mian (Lat. *Neocomum*, Neuchâtel), in geology, a term applied to the lowest marine stages of the Cretaceous system, because of its typical occurrence at Neuchâtel in Switzerland. There and in southern France this formation, consisting of limestones and marls, is as much as 1,600 feet thick. The term corresponds to the English Wealden and lower greensand, and to the German Hils; is little used in America; and in France is used broadly and strictly, Neocomian in the wider sense including the stricter Neocomian (made up of Hauterivian and Valanginian), as well as Barremian and Aptian. Consult Pavlow, 'Quarterly Journal London Geological Society,' Vol. LIII., 1896.

Neody'mium, in chemistry, a substance, provisionally considered to be an element, whose existence as a constituent of didymium (q.v.) was recognized by Auer von Welsbach. It has the chemical symbol Nd and an atomic weight of about 140.8, and is distinguished from other constituents of didymium by yielding rose-colored salts. Its oxid has the formula Nd_2O_3. Further research is necessary before the elementary character of neodymium can be regarded as positively established.

Ne'ogene (Greek, «late-born,» «late»), in geology, a term used by Continental geologists to include the Lyellian Pliocene and Miocene, that is, corresponding with Neocene (q.v.), as used by the U. S. Geological Survey.

Neolith'ic, in archæology, the more recent of the two periods into which the Stone Age has been subdivided. The Neolithic stone implements are finely shaped and polished, and are found in connection with the remains of extinct animals.

Ne'on (Greek, «new»), a gaseous element constituting from the fifty-thousandth to the hundred-thousandth part of the bulk of the earth's atmosphere, which was discovered by Ramsay and Travers, in 1898, in liquid argon. Neon closely resembles helium and argon (qq.v.) in its general properties, but its properties are less perfectly known. The density of neon appears to be about 9.96 times as great as that of hydrogen under the same conditions of temperature and pressure; and although no compounds of neon with other elements have yet been prepared, this density, taken in connection with the fact that the ratio of the specific heats of the gas appears to be 1.66 (see Argon, and Gases, Kinetic Theory of), indicates that the atomic weight of neon is about 19.92.

Ne'ophyte (Greek, «newly planted or grafted on»), originally applied to those newly initiated into the Eleusinian or other ancient Greek mysteries, of whom Plato says, «there are many wand bearers (the wand being the badge of the initiated) but few mystics.» The catechumens who had been just baptized were so styled in the early Church. These newly made Christians were considered less likely to stand firm against paganism than their older and more experienced brethren. Hence the term was slightly tinged with disparagement. St. Paul forbade the ordination of the neophyte or novice (1 Tim. iii. 6), and the 3d Council of Arles (524) decreed that a year's probation was necessary for candidates for holy orders among the newly baptized. Yet Ambrose was elected bishop of Milan (374) when he was but a catechumen and was consecrated soon after his baptism. Newly converted pagans or disbelievers are still styled neophytes by Roman Catholic missionaries and Gregory XIII. established a college at Rome (1622), the Propaganda, in which they might be educated and trained to preach to and convert the people of their own land.

Ne'oplasms. See Tumors.

Neoptolemus, nē-ŏp'tŏl'ē-mŭs (also called Pyrrhus), in Greek legend, the son of Achilles and Deidamia. Taken to Troy by Odysseus, he was one of the band who captured the city by means of the wooden horse. He slew Priam and took to himself Andromache, the wife of Hector. He afterward went to Epirus, where he married Hermione, in consequence of which Orestes, her former lover, killed him.

Neornithes, nẹ-ôr'nĭ-thēz, or **Euornithes**, a sub-class of the class *Aves* (birds) embracing all known birds, fossil or recent, since the Jurassic Period, as distinguished from another sub-class, *Archæornithes*, which, contains, so far as yet known, only the archæopteryx (q.v.). The sub-class *Neornithes* may be divided into three sub-divisions, namely (1) *Ratitæ;* (2) *Odontolcæ;* (3) *Carinatæ.*

Neosho, Mo., city, county-seat of Newton County; on the Kansas City, P. & G. and the St. Louis & S. F. R.R's; about 170 miles southwest of Jefferson City and 140 miles south by east of Kansas City. It was settled in 1839; in 1868 was incorporated as a town, and received its city charter in 1878. It is near the lead and zinc mining region of Missouri. The chief manufacturing establishments are machine-shops, flour mills, foundry, agricultural implement works, repair shops, and furniture factory. There is located here a government fish hatchery which occupies 13 ponds. It is the seat of the Scarritt Collegiate Institute (M. E. South) and has a high school, elementary schools, and a public school library. Pop. (1910) 3,661.

Neosho, ne-ō'shō, a river which has its rise in Morris County, Kan., in the central part of the State. Some of the small streams which form the head-waters have their sources near short streams that flow north into the Kansas River. The Neosho flows south by east and enters the Indian Territory at the northeast corner. It continues an irregular course, mainly southeast, for a distance of about 40 miles, then turns southwest, which course is continued to its junction with the Arkansas River at Fort Gibson. Its whole length is about 355 miles. Some of the cities on its banks are Council Grove, Emporia, Burlington, Iola, Humboldt, Erie, and Oswego, all in Kansas.

Neot'eny, a term formerly applied to a phase of Parthenogenesis (q.v.). The larva of Amblystoma, or the Siredon, has been known not infrequently to lay eggs which have hatched young. This appears due to the premature development or acceleration of the reproductive organs and is comparable to the phenomenon of production of larvæ by the maggot of a fly (Miastor) to which the name of pædogenesis has been given. See under PARTHENOGENESIS.

Neotrop'ical Region, or **Neogæa,** one of the primary faunistic divisions in the zoogeographical scheme of Wallace and Sclater, embracing South America, Central America, as far north as the highlands of northern Mexico and the West India islands. It is perhaps the most sharply defined and separable of all the «regions,» but shows some extraordinary affinities with eastern South Africa (Madagascar) and Australasia; hence some students of the distribution of animals have united it with those parts of the world in a still more comprehensive «province,» called the Antarctic or Neogæan, in contrast with the Northern hemisphere as the Holarctic or Arctogæan Province. See ZOOGEOGRAPHY.

Neozo'ic (Greek, «late life»), in geology, a term introduced by Edward Forbes, but never in common usage, to include the Mesozoic and Cenozoic, between which he argued there was no such distinction as between them on the one hand and the Palæzoic on the other. The word is sometimes used as an equivalent of Tertiary and sometimes as synonymous with Cenozoic.

Nepal, nĕ-pâl, **Nipal,** nē-pâl', or **Nepaul,** Asia, an independent kingdom, on the southwest slope of the highest part of the Himalaya range, north of India, bounded on the north by Tibet, on the east by Sikhim, and on the south and west by Bengal, and the United Provinces of Agra and Oudh, British India. It lies between lat. 26° 25' and 30° 17' N., and lon. 80° 6' and 88° 14' E.; is 500 miles long with a maximum breadth of 150 miles, and has an estimated area of 54,000 square miles. The main portion of the country is a table-land from 3,000 to 6,000 feet above sea-level. Within its boundaries are the highest mountains in the world, Everest, Dhawalagiri, and on its eastern border, Kanchinjinga. From the mountains, the land gradually descends southward, forming four distinct terraces, differing in climate and vegetation. The Terai or southern lowland, well wooded and extensively cultivated, is traversed by numerous small streams. The most important rivers are the Karnali, the Gandak, and the Kusi, all of which rise in Tibet, and force their way through the Himalayas, by deep and precipitous gorges to join the Ganges. The climate is on the whole, temperate, except in the most elevated northern districts, where it is very cold. Magnificent forests of sal, sisoo, and toon trees stretch along the declivities of the lower hills into the adjacent plains. The forests higher up exhibit a greater variety, gradually assuming more and more of an Alpine character. The principal products are rice, wheat, barley, pulse, sugarcane, buck-wheat, hemp, cotton, tobacco, and madder. In the mountainous parts a valuable article of cultivation is a large species of cardamom, and in other places ginger is grown to a considerable extent. Pasturage is on the whole scarce and indifferent. The sheep and goats, however, have fine wool. Horses are imported from Tibet. The wild animals are elephants, black bears of great size, hogs, hog-deer, foxes, jackals, and a few tigers. Fish abound in the streams of the Terai. The manufactures of Nepal are confined chiefly to two kinds of coarse cotton cloth, called khadi and changa, of which the dress of the middle and lower classes of the people is made. Articles in copper, brass, and iron are also manufactured in various places; likewise bells of a kind of bell-metal called phul, but considered inferior to those of Tibet; and also a very strong paper, remarkably well fitted for packages. The trade of Nepal is chiefly carried on with British India and Tibet. From the former it imports Bengal cottons and muslins, silks and raw silk, carpets, English cutlery, etc.; and from the latter Chinese silk stuffs, paper, drugs, gold and silver, sheep, musk, skins of the musk-deer, etc. Its chief exports are the natural products of the country.

The government of the country is a military oligarchy with a maharaja as the nominal head, but a prime minister as its real ruler. The ruler acknowledges a certain amount of dependence on the Chinese government, but is in more real dependence on British authority. A British Resident and a small body of British troops are stationed at the capital, Khatmandu, and British influence is gradually increasing. The population of the country is estimated at over 2,000,000. The inhabitants are chiefly Newars, a race probably of Mongolian and Chinese origin; the dominating race is the Ghurkas (q.v.). In the east there is a considerable mixture of Hindus. The prevailing religion is Brahmanism, but there are also some Buddhists. Most of the domestic servants are slaves. The ordinary language of Nepal is the Prabratiya or mountain Hindu dialect, but the Newars have a language peculiar to themselves. The country was formerly possessed by numerous independent rajahs, and extended west to the Sutlej; but about the middle of the 18th century the rajah of Ghurka began to extend his dominions by conquest, in which he and his successors were so successful that in less than 50 years they had conquered the whole of Nepal, and made themselves kings of that territory. Subsequently (1816) a large portion of the kingdom was cut off by the British, who reduced its western limit to the river Kali instead of the Sutlej. By the Kot massacre in 1845 Jung Bahadur made himself master of the country, and proved a firm but beneficent ruler; at his death in 1877 he was succeeded by his brother who reigned until his assassination in 1885, when he was succeeded by the present maharaja Dhiraj Pirthvi Bir Bikram, born 1875.

Nepenthe, nę-pĕn'thē (Greek, *nē*, a negative prefix, and *penthos*, sorrow), a magic potion or drug which was fabled by the poets to banish the remembrance of grief and to cheer the soul. The invention was attributed to the Egyptians.

Nepen'thes, a genus of pitcher-plants (q.v.).

Neph'elite, or Nephelin, a native silicate of aluminum, potassium and sodium, crystallizing in the hexagonal system, and also occurring in massive forms. It exhibits various colors, and has a vitreous lustre, a hardness of from 5.5 to 6, and a specific gravity of about 2.6. It occurs in recent eruptive rocks, notably at Mount Somma, Vesuvius.

Nephe'lium, a genus of fruit-trees. See LITCHI.

Nephi, nē'fī, Utah, city, county-seat of Juab County; on the Sanpete V. and the Oregon S. L. R.R.'s; about 80 miles south of Salt Lake City. It is in a high valley in which there are a number of good farms. The chief products of the surrounding country, all of which contribute to the prosperity of Nephi, are farm products, salt, gypsum, lumber, and live stock. Pop. (1910) 2,759.

Neph'oscope, an instrument for determining the apparent velocity and motion of clouds. It is in the form of a horizontal mirror, with compass-points or degrees drawn on the mirror, or on the surrounding frame; with an adjustable sighting piece placed above the mirror. The sighting-piece serves as a fixed point for viewing the cloud shadow as it moves away from the centre of the mirror.

Nephrectomy, the excision or removal of a kidney. In cases of calculi, multiple abscesses, pyonephrosis, hydronephrosis, sarcoma, wounds, tears and ruptures of the ureters, and movable kidneys this operation may be called for. The removal of a single or horseshoe kidney is considered a fatal operation. Before removing a kidney it is necessary to ascertain whether the remaining organ is capable of excreting its due amount of urine. Abdominal nephrectomy (anterior nephrectomy) is the excision of a kidney through an incision in the abdominal wall; lumbar nephrectomy (posterior nephrectomy), an excision, through an incision in the loin.

Nephrorrhaphy, nephropexia, or nephropexy is the fixation of a movable kidney by sutures.

Neph'rite. See JADE.

Nephri'tis. See BRIGHT'S DISEASE; CIRRHOSIS, KIDNEYS.

Nephrotomy, incision of a kidney, an operation deemed necessary by the surgeon when it has been ascertained by exploration with the aspirator-needle or otherwise that the kidney is the seat of any condition or disease which endangers the life of the patient. It is resorted to for the removal of calculi (nephrolithotomy), of tumors, and for relieving congestion.

Nephthys, nĕf'thĭs, in Egyptian mythology, a deity, sister of Osiris and Isis, wife of Typhon, and mother of Anubis by Osiris. Some consider her as the symbol of the Egyptian coast on the Mediterranean; others as the personification of the five intercalary days of the Egyptian year, in which point of view they are called her children by Mercury, the Sun, and Saturn.

Nep'idæ. See FRESH-WATER INSECTS.

Nep'igon, or **Nip'igon,** a lake in Canada, in the northwestern part of the province of Ontario; about 33 miles north of Lake Superior. It is over 800 feet above Superior; about 65 miles long and 40 miles wide; its outlet is Nepigon River which flows south and enters Lake Superior through Nepigon Bay. The coast line is remarkably rocky and irregular, in some places lofty headlands; the total length of coast line is nearly 600 miles. It has a number of small wooded islands. Several streams enter the lake, and in the vicinity are a large number of small lakes, all of which, together with Nepigon, once formed a very large lake. The lake is a favorite place for sportsmen as it is well stocked with fish.

Nepomuk, Johann, yō'hän nā'pō-mook, patron saint of Bohemia: b. Pomuk between 1330 and 1340; d. Prague 20[?] March 1393. He rose to be a high ecclesiastical dignitary, and was put to death at the order of King Wenzel IV. of Bohemia by being thrown into the Moldau River. Differences as to Church policy and other reasons, often conflicting, are assigned for this procedure. But the most authentic account, compiled (1670) originally by Bohuslav Balbinus, a Jesuit, narrates the story as follows: According to Balbinus, Nepomuk obtained the degree of magister at Prague, eventually became almoner to King Wenzel and confessor to Queen Johanna and, after imprisonment and torture, was put to death for refusal to divulge certain matter of the confessional. Balbinus dates the martyrdom in 1383, but the best sources make the time as above given, 10 years later. Hajek of Labocan conjectured (1541) that there were two Johns and this idea was assumed by Balbinus; but Dabrovski established (1787) the fact that there was but one. Abel ('Die Legende vom heiligen Nepomuk' 1855) presented the curious theory that John of Nepomuk was really the development of the Protestant hero, John Huss, into a Catholic saint. But this is altogether without foundation. Previous to his canonization by Pope Benedict XIII. in 1729, Nepomuk had already been venerated as protector against slander and danger by water. His day, 16 May, is still observed in Bohemia as a time of high festival. Consult: Frind, 'Der geschichtliche Johannes von Nepomuk' (2d ed. 1871).

Nepos, nē'pŏs, **Cornelius**, Roman historian: b. Upper Italy about 100 B.C.; d. about 24 B.C. His earliest writings consisted of verses and three books of 'Chronica.' With the exception of a geographical treatise, his remaining works were directed toward the study of manners, customs, and character. Such are the five books of 'Exempla,' supposed to have been an account of the men who stood as types of the virtues of earlier Rome. Such, too, were the elaborate biographies of Cicero and Cato the Elder. But the most comprehensive of his publications was the 'De Viris Illustribus' ('Of Illustrious Men') in probably 16 books, in which the lives of foreigners and of Romans were juxtaposed in a parallel arrangement. Of this there are extant the portion 'De Excellentibus Ducibus Exterarum Gentium' ('Of Prominent Foreign Generals') and the biographies of Cato and Atticus. The lives of Atticus and Cato have been uncontestably assigned to Nepos, but until the edition of Dionysius Lambinus (1569) the 'De Excellentibus Ducibus' was supposed to be the work of a certain Æmilius Probus. Lambinus' verdict, based on both historical and stylistic grounds, has been almost universally accepted. The style of Nepos is too colloquial; his matter is often lamentably inaccurate; but the essays are in general well arranged and fair in their judgments. There are several good editions by Nipperdey (rev. by Lupus 1879) and others.

Nep'otism, a system or custom practised by several of the earlier popes of granting high honors, dignities, offices, pensions, and the like to their family relations, generally their nephews; hence family favoritism of any sort.

Neptune, (1) in astronomy, the most distant of the known planets, its mean distance from the sun being 2,745,998,000 miles, and its least distance from the earth 2,629,000,000 miles. The eccentricity of its orbit is .00872; its inclination to the plane of the ecliptic is 1° 47'. The apparent diameter is about 2' 7". The real diameter is estimated at 36,000 miles, and it seems to have very little polar compression. Its mass is about 16¾ times that of the earth. The largest telescopes give us little information as to whether or not it has belts. A satellite of Neptune was discovered by Lassell of Liverpool in 1846. It is peculiar in revolving from east to west. Neptune revolves round the sun in 164.6 years. (2) In Roman mythology the god of the sea; son of Saturn and Rhea, and brother of Jupiter and Pluto. He is variously represented; sometimes with a trident in his right hand, a dolphin in his left, and with one of his feet resting on part of a ship; at others in a chariot drawn by sea-horses, with a triton on each side. See POSEIDON.

Neptune, Temple of, the name of two ancient structures, one at Paestum in Lucania, and the other on the Campus Martius in Rome. The latter was erected by Agrippa 26 B.C. It was destroyed by fire 80 A.D., but was restored by Hadrian.

Neptu'nian Theory (Lat. *Neptunus*, god of sea), in geology the view advanced by Werner that geological change is due entirely to the influence of water, the earth in the beginning having been covered with water, which hold rock-material in solution. This hypothesis, also styled Diluvian Theory, was opposed by the Vulcanians, who held the igneous theory. See GEOLOGY.

Nérac, nā-răk', France, a town, capital of an arrondissement in the department of Lot-et-Garonne, 16 miles southwest of Agen, on the precipitous banks of the Baise. In its old castle, now a mere ruin, Henry IV., of whom there is a bronze statue in the town, spent part of his youth, and at an earlier period Calvin and other reformers found an asylum with Margaret of Valois, queen of Navarre. The town has manufactures of coarse woolens, ship-biscuit, corks, etc.

Nerbudda, nĕr-bŭd'dạ, or **Narbada**, när-bä'dä, India, a river which rises in the Maikal range, 3,493 feet above sea-level, in the north of the Central Provinces, flows first west and northwest across the Amarkantak plateau, then west, inclining gently to the south, and after forming part of the boundary between the Central Provinces and Indore, falls into the Gulf of Cambay, after a course of about 800 miles. In the wet season it rises in some places 25 feet, and in others 70 feet above its lowest level. Though much obstructed by shelves and cataracts, it is navigated by boats to the falls of Daree, about 250 miles from its mouth. To the Hindus the river is a sacred stream, almost equal to the Ganges in sanctity. It is regarded as a meritorious act to walk from the sea to its source and back again along the banks of the river. There are valuable coal and iron beds in the valley near Hoshangabad, and a railroad skirts the river from Barhanpur to Sihora.

Nereids, nē'rē-ĭdz, in Greek mythology, were sea nymphs, daughters of Nereus and Doris. They were 50 in number, and they had, like their father, the gift of prophecy and the power of assuming different shapes. They were specially the nymphs of the Mediterranean, and were distinguished on the one hand from the Naiads or the nymphs of fresh water, and on the other hand from the Oceanides or nymphs of the ocean.

Ne'reis, a marine annelid, one of many species, scattered throughout the world, of polychæt worms (see POLYCHÆTA), of the family *Nereidæ*, which contains the most highly organized of this group of animals — "the highest type of *Annulata*" according to Packard. Their bodies are visibly annulated, flat and scaly. A distinct head is present, provided with a retractile proboscis, which is usually armed with teeth or jaws. Eyes and tentacles are borne on the head. The locomotive appendages are very fully developed, and the respiratory or breathing organs, in the form of tuft-like branchiæ or gills of rudimentary nature, are borne on the dorsal aspect of the body-segments. The sexes are separate, the eggs are probably laid in masses between tide-marks, and the young at first appear as surface-swimming ciliated bodies, but the stages of development have not been traced. A typical and numerous species on the Eastern American coast is *Nereis virens*, which lives between tide-marks in holes in the mud. It secretes a viscid fluid lining its hole, up which it moves, pushing itself along by its bristles and ligulæ. At night, probably, during the breeding season, they leave their holes and swim at the surface of the water. Some of these nereids are what Van Beneden calls «free messmates.» *N. bilineata* and *N. succinea* inhabit the tubes of a species of Teredo, and *N. costæ* is found in the cavities of sponges. Consult: Packard, 'Zoology' (1897); Arnold, 'Sea Beach at Ebb Tide' (1901).

Nereus, nē'rūs, in Greek mythology, a divinity of the sea, the progenitor of the Nereids (q.v.). He is represented as an old man, with a wreath of sedge, sitting on the waves with a sceptre in his hand.

Neri, Filippo de', fē-lēp'pō dā nā'rē (known in English as Saint Philip Neri) founder of the order of Oratorians (q.v.): b. Florence 22 July 1515; d. Rome 26 May 1595. He was of noble family with rich connections, but his only aim in early life seemed to be that of self discipline and the pursuit of learning. He deliberately sacrificed the favor of a rich uncle, who wished to make his nephew heir to his fortune, by secretly leaving him (1533) and taking up his residence at Rome as private tutor in a gentleman's family. He sold his books in 1538 and gave the price to the poor, and ever afterward devoted himself to the sick and to pilgrims. In 1548 he established the Fraternity of the Holy Trinity for the succoring of the sick and pilgrims, founding the hospice which later became one of the finest at Rome. He did not enter the priesthood until 1551 and in 1574, with Cæsar Baronius and other priests, he founded the Oratorians of which he was styled «Father» up to 1592. His congregation received the approval of Gregory XIII. in 1575. He was the most popular saint in Europe since the days of Francis d'Assisi and of unprecedented independence and originality in his life and utterances. Goethe has styled him «a saint with a sense of humor.» His motto was «Spernere mundum, spernere se ipsum, spernere se sperni.» (Despise the world, despise self, think it a light thing to be despised of all.) He was canonized in 1622, and in 1726 the day selected for his festival was the anniversary of his death. His letters (1751), poems (Rime Oneste, Vol. 8), have been published. Consult: Gallonio, 'San Filippo dei Neri'; Reiching, 'Leben des heiligen Philippo de' Neri' (1859).

Neri'ne, a genus of plants of the order *Amaryllidaceæ* (q.v.). The 10 species, which are all South African, are bulbous-rooted, have narrow leaves which die down during the spring months, and leafless scapes which appear in late summer surmounted by umbels of strikingly beautiful six-parted flowers varying from scarlet through all tints to white, and seemingly covered with hoar frost. In popular usage the name *Nerine japonica* is used, but this name is properly applied to a distinct plant, which, however, has similar habits and may be managed in the same way. It has black seeds; true nerines have green seeds. The most commonly grown species is *N. sarniensis*, the Guernsey lily. The bulbs should be planted in autumn in the greenhouse and given plenty of water and plant food until the leaves turn yellow when both may be gradually withheld, the pots laid on their sides and the bulbs allowed to mature. In late summer, when the plants show signs of life, water may be given.

Nernst, nĕrnst, **Walther,** German physicist: b. Briesen, West Prussia, 25 June 1864. He was educated in the leading universities of Germany and in 1889 became lecturer in chemistry at Leipsic. In 1891 he was called to the chair of chemistry at Göttingen where in 1895 he established an institute for physical chemistry. His invention of the Nernst incandescent electric lamp has made him a prominent figure in the electrical world. He has written: 'Theoretische Chemie' (1898); 'Ueber die Bedeutung elektrischer Methoden u. Theorien für die Chemie' (1901); etc.

Nernst Lamp. See ELECTRIC LIGHTING.

Ne'ro, Lucius Domitius Ahenobarbus (after his adoption by the Emperor Claudius called Claudius Cæsar Drusus Germanicus), 6th Roman emperor: b. Antium (Latium) 37 A.D.; d. 68 A.D. He was the son of Gneius Domitius Ahenobarbus and Agrippina, the daughter of Germanicus. His adoption was due to the marriage of his mother with the emperor. Soon after, when only 16 he married Octavia, daughter of Claudius and Messalina 53 A.D. Agrippina wished to secure the succession to her own son to the prejudice of Britannicus, the son of Claudius. In this she succeeded, and Nero became emperor on the death of Claudius in the year following 54 A.D. His tutors were able men, Burrus, the prefect of the prætorian guards, and the philosopher Seneca (q.v.). For a short time he gave a promise of reigning well, and allowed himself to be guided by his instructors, but it was not long before he gave himself to the greatest excesses and cruelty. His first crime was the poisoning of Britannicus, 55 A.D., whom Agrippina, having quarreled with her son, threatened to raise to the throne in place of Nero. He next caused Agrippina herself to be put to death, 59 A.D. The most distinguished victims of his cruelty, beside Britannicus and Agrippina, were his instructor Seneca, the poet Lucan, and his wives Octavia and Poppæa Sabina. «My predecessors,» said he, «did not know the rights of monarchy. People may hate me, if they only fear me.» During his reign, in 64 A.D., a great conflagration took place at Rome, which lasted for six days and seven nights, and when thought to have been extinguished, broke out and burned two days more. During this fire most beautiful monuments of art and of history were burned to the ground. Nero was commonly suspected of being the originator of the fire, with the view of having a real representation of the burning of Troy; and although this suspicion was admitted by Tacitus to be without evidence and is regarded by modern scholars as almost incredible, it was so generally entertained at the time that Nero did his utmost to transfer the guilt of this action to the Christians, whom he caused to be cruelly persecuted for it throughout the empire. He caused the burned part of the city to be rebuilt in a manner more splendid and magnificent than before. The most remarkable of his buildings was the palace which he erected for himself in Rome, known as the Golden House. Several conspiracies, formed against him in Rome, ended in the destruction of the conspirators themselves. At last the revolt of Galba, his governor in Spain, succeeded. The Prætorian guards declared for Galba, and the Senate pronounced against Nero sentence of death. The tyrant anticipated the punishment which awaited him through requesting death by the sword of an attendant. Consult: Baring-Gould, 'The Tragedy of the Cæsars,' Vol. II. (1892).

Nero, Golden House of. See Golden House of Nero.

Ne'roli, a perfume, extracted from the flowers of a small Italian orange tree. It is an essential oil, obtained by distillation from the orange blossoms.

Nertchinsk, nĕr-chĭnsk', Siberia, a town in the Transbaikalia Territory, on the Nercha, near its mouth in the Shilka, 570 miles east of Irkutsk. Although comparatively small it is an important trading çentre for Russians, Mongols, Turcomans, and Tunguses, and has a considerable export trade in the gold, silver, lead, tin, and zinc of the surrounding mining region. Pop. about 8,000.

Nerthus, nĕr'thŭs, in German mythology, a goddess, regarded as representing the earth.

Ner'va, 13th Roman emperor: b. Narnia, Umbria, 32 A.D.; d. 98 A.D. He occupied posts of trust in the reigns of Vespasian and Titus. He became emperor at an advanced age, after the assassination of Domitian, 96 A.D. through the aid of Parthenius, chamberlain of the imperial palace, and Petronius Secundus, commander of the Prætorians. Nerva was a man of cultivated mind, with some poetical talent. His reign was beneficent. He recalled exiles, allowed no senator to be put to death, abolished several oppressive taxes, observed a strict economy for the relief of the poor, and tolerated Christianity. But he was unable to put down the violence and insubordination of the Prætorian soldiers. Seeing, perhaps, that an element of greater energy was needful, he adopted as successor Marcus Ulpius Trajanus (see Trajan), then commanding an army in Germany, whom he made co-sovereign. Consult: Merivale, 'History of the Romans under the Empire' (1865).

Nerval, Gerard de, zhä-rär dė när-väl (properly Gerard Labrunie), French author: b. Paris 21 May 1808; d. 26 Jan. 1855. He was educated at the Lycée Charlemagne, and made one of the first renderings (1828) of Goethe's 'Faust.' In his 'Poésies Allèmandes' (1830) are to be found translations from other German authors, such as Schiller, Uhland, and Heine. He was a collaborator on various literary periodicals; wrote verse, including 'Elégies Nationales et Satires Politiques' (1827); a few dramas, among them 'L'Alchimiste' with Dumas; and several volumes of prose, such as 'Scènes de la Vie Orientale' (1848–50), and 'La Bohème Galante' (1855).

Nervii, nĕr'vĭ-ī, an ancient people of Gaul, famous for the stand they made against Cæsar's advance in 57 and 54 B.C. They submitted to the Romans in 53 B.C.

Nervous Diseases, disorders arising either from actual changes in the structure of nerve-fibres or nerve-centres, or from some irregularity of nerve-function without actual structural change. Thus nervous diseases may be due to inflammation or degeneration of nerve-substance; to the pressure on some part of the nervous system by tumors, effused blood, or other fluid; to the death of some part by the cutting off of its blood-supply, etc.; to accident or injury due to internal or external poisons, or to violence; or they may be the result of lowered nervous action as a part of general bad health. It is customary to speak of organic and functional diseases of the nervous system, meaning diseases in which structural changes are demonstrable, and those in which no such alterations can be seen by appropriate instruments of precision. While such a difference is perfectly valid from the practical point of view, from the more scientific standpoint no such distinctions can be maintained save on the most general grounds.

Nervous diseases are further subdivided into affections of the motor and sensory functions of the body (neuroses), and those of the mental or thought processes (psychoses). Most disorders occupy both fields within certain limits, the distinctions being purely formal and academic. Nervous diseases are extremely widespread in the community. It has been estimated that one in every 300 of the population is afflicted with some one of the insanities; one in every 500 has epilepsy, and it is common belief that neurasthenia is on the increase. Diseases of the nervous system are naturally increasing with the increasing population. Whether this is a relative increase or not is not definitely proven. So far as the insanities are concerned, there seems to be little doubt that they are not only relatively but absolutely increasing. With respect to this latter belief, however, it should be remembered that the increase in the material comforts afforded patients suffering from insanity is tending to encourage the community to send their semi-dependent members to institutions and thus escape the individual cost of their care. This makes an apparent increase in the proportion of insanity, for many cases in this manner enter into statistics which would not otherwise be counted. The complex conditions of modern civilization are causative in bringing about a certain amount of breakdown of the nervous system, and the keen competition for subsistence and for luxuries also tends to increase these evils.

Nervous diseases present a greater diversity of symptoms than disease of any other organ-system of the body. Over 200 divisions have been made, and this number is subject to constant revision. The nervous system is the most highly developed and most intricate part of the body; hence nervous diseases present a greater complexity than any others. At the same time, so far as the neuroses are concerned, their accurate determination is a matter of very precise anatomical knowledge. This gives to the study of them a peculiar fascination. Nervous diseases are further characterized by their extreme severity. Other organs of the body, when diseased, recover their functions in a comparatively short time. Nerve-function, when disturbed, recovers very slowly. Chemically, nervous tissue is extremely complex and much time is necessary to reconstruct it after injury. This is particularly true for mental diseases. Years and months are necessary for recovery, when weeks and days are occupied in the restoratior of non-nervous structures. Economically, nervous diseases are of serious effect, frequently depriving the community of wage-earners without eliminating them, so that they become burdens; and they contribute to swell their own ranks by the added stress they cause to the community which must support them. The great majority of chronic invalids are those suffering from nervous ailments. Idiots, imbeciles, the insane, epileptic, paralytic, and criminal make up a large class of parasites. The study of economic conditions due to disorders of nervous structures is of wide and practical import. It is the largest and most important chapter in social economics.

One of the most important agents in reducing the amount of nervous disease is hygienic living, and a greatly increased amount of general information bearing on the part played by alcohol and other poisons in the development of nervous affections. All things considered, it seems highly probable that there is a relative decrease in nervous diseases in the community. It is highly desirable that in the primary schools, high schools, and colleges, more attention should be paid to the education that fits people better for the conditions with which they are to struggle in after years. Physical exercise, gymnastics, open-air play, nature-study, general rules of hygienic eating, of hygienic clothing, and the general principles of preventive medicine should enter into the curriculum of every school for both sexes. All this is being provided for wisely in most of the communities of the United States, and there is every reason to suppose that coming generations will be much better fitted physically to stand nervous stress than their predecessors.

Text-books on nervous disorders are numerous. A few of the more important recent works are here mentioned. Reference works: 'Jahresbericht über die Fortschritte in der Neurologie und Psychiatrie,' the most important bibliographic work published. Nothnagel's 'Specielle Pathologie und Therapie' contains the most recent series of monographs bearing on nervous disorders. Brourdel's 'Traité de Médécin' is one of the best recent French collections. Albutt's 'System of Medicine' is the best of the recent English systems. Valuable individual works on diseases of the nervous system are those of Starr, Dana, Church and Peterson, Gowers, Dejerine, and Oppenheim. On mental disorders Ballét's 'Traité de Pathologie Mentale' (1904) is one of the most comprehensive as well as most recent. Kraepelin, Weygandt, and Ziehen are German authors in favor; Berkeley, Defendort, Peterson, and Haines are well-known American authorities; Maudsley, Mercier, Clouston, and Bevan Lewis are among the foremost English writers of a generation past; Bianchi, in Italy, and Muratow, in Russia, are other well-known authors on nervous diseases. See BRAIN; INSANITY; NERVOUSNESS; NERVOUS SYSTEM, EVOLUTION OF THE; NEUROSIS; NERVOUS SYSTEM, TRAUMATIC AFFECTIONS OF THE; PSYCHIATRY; PSYCHOSIS.

Nervous System, Evolution of the. The nervous system is that part of the body which has developed most particularly the function of adapting the different organs of the body to their environment. It is the great regulator of all the physiological processes. It may be said to consist of two parts, that portion which has to do with the reception of impulses from without, in general spoken of as the sensory nervous system, and that portion which, in response to the incoming impulses, causes some form of adaptation in answer. Such adaptations are often of a muscular character, and the motor-nervous structures are concerned in bringing about such relationship. The human nervous system is fundamentally arranged on this plan, but while theoretically so simple in organization, practically and anatomically it is an extremely complex and complicated series of structures. This complexity is the result of untold ages of development; but a study of the nervous system in a number of the lower forms of life, as well as the study of the various nerve-structures of man himself in their development from the fœtal stage, has enabled the student of the human nervous system to trace the gradual steps of its evolution.

Plants are considered not to possess any nervous structures, yet the protoplasm responds to many forms of stimuli in much the same manner as the protoplasm of more highly developed living things. In a few plants, Venus' fly-trap, the sensitive plant, etc., there are found certain cells in the midribs of the leaf and in the stem, in which the protoplasm differs from that of other plants. They do not possess special nervous structures, but they are cells in which the protoplasm seems to possess special nervous conductive properties. In many of the lowest animals no known nervous structures have been found, but even in the very simplest animals the prototypes or forerunners of human nerve-structures are known to occur. In these animals the simple nerve-unit or neuron is found. In its simplest form this neuron consists of a strand of nervous tisue, a nerve-fibre, in some portion of which an enlargement or nerve-cell (so called) occurs. From the nerve-cell (or station, as it were) the fibre usually passes out in two directions, becoming attenuated in its passage and, branching or not, finally terminates in extremely fine processes (dendrites), which in different animals widely vary. One branch of this neuron is usually found in the periphery of the animal body, and may be spoken of as the incoming or sensory part of the structure; the other is frequently distributed to the muscles of the body. As the animals rise in the scale of complexity, this most primitive condition becomes modified, and a neuron of distinctly sensitive nature develops, which is brought in contact by the end-filaments of the neuron-branches with a similar motor neuron.

Such simple arrangements are found in animals of the very lowest organization, polyps, sponges, etc. In higher animals collections of these neurons form ganglia. These ganglia, at first isolated, become co-ordinated and grouped until as in the insects, for instance, a double chain of ganglia is found from in front of the mouth to the anus, arranged along the abdomen. These ganglia are connected by cables of nerve-fibres, and to and from each ganglion sensory and motor fibres pass, and thus the entire nervous system is brought into co-ordination. In thought it is but a step from the ventral double chain of ganglia in the insects to the solid spinal cord of the mammals with its ganglionic enlargements, constituting the medulla and brain (see BRAIN), but it has taken many ages to bring about this integration. Theoretically, the nervous structure of the lowest mammals, *Amphioxus* and *Petromyzon,* are of the simplest type, a trifle more advanced than the insect double chain; but in the study of the nerve-structures of these lowest forms glimmerings of the complex nervous system of man are to be found. The homologues of the much diversified and complex spinal cord and brain in man are present in the primitive conditions in these animals.

While the developmental stages of the growth of the nervous system to its present complexity may be thus summarized, the details of the different forms are intricate, and only on philosophical grounds can they be thus described. In the lowest *Infusoria* structures that are definitely nervous in their function, and resembling nervous tissue in their forms, are first met with. These are located almost exclusively on the periphery of the body. In the bell-animalcules (*Vorticella, Stentor,* etc.) a mixed form of neuromuscular cells is found. These possess the combined functions of these two types of tissue. In the sea-anemones and polyps similar nervous structures are found and small ganglionic masses are present. Starfish possess a comparatively complex nervous system. Each arm of the starfish has a small ganglion near the mouth, and a nervous cord passing down the arm. The ganglia are farther connected by special nerve-fibres, bringing about an integration of nervous impulses. In the mollusks (snails, oysters, clams, etc.) the nervous system consists of a ring of ganglia surrounding the œsophagus; one above is larger and by some is spoken of as a brain, but it is not homologous with the brain of mammals in any sense. Communicating fibres pass to the foot, and to the breathing apparatus. In the worms the nervous system is still more complex. An enlarged double bilateral ganglionic mass at the head of the animal constitutes the brain; special offshoots pass to nervous structures in the eyes on each side; double cords pass backward, connecting the brain with paired ganglia, which may be fused into one mass or may be separated and connected by commissural fibres. From the ganglionic enlargements fibres pass out to the periphery of the body. This form of nervous system represents in skeleton what the more complicated mammalian system is to become. It is bilateral and is segmented, or metameric. The bilateral character of the mammalian nervous system remains throughout, with but slight fusion; the metameric character, however, undergoes many changes by the fusing together of ganglionic masses and their later distortion. The separate ganglionic mass in the worms entails greater individual independence. Thus if the head of a centipede be cut off, the legs will still cause the animal to run. Ants, flies, and butterflies will move about aimlessly for some time after the head is cut off. The head-ganglion in the ant is much more complex than in many other insects, showing in some measure by its structure the more highly developed character of this animal's "brain-ganglion."

The transition from lower to higher types of nervous system is found in one of the lowest of the vertebrates, the *Amphioxus*. In the lower forms the ganglionic masses and their connecting cords are located for the most part in the lower or ventral portion of the body, and the ganglia and fibres are distinct. In the vertebrate type the nervous system becomes dorsal, and the ganglia and fibres become fused into a long cord, or cerebro-spinal axis, which lies protected in the bony cavities of the skull and spinal cord. Certain accumulations of ganglionic centres occur and give a varying form in the different animals, and throughout the entire cerebro-spinal axis there runs a small cavity. In the head, or cephalic end, the brain is located, the ganglion-cells, or gray matter, being usually situated on the outside of the mass, the connecting and collecting fibres, white matter, on the inside. In the lower or cord portion, the gray masses come to lie on the inside of the structure and are partly surrounded by the fibres (see SPINAL CORD.) The ganglionic masses in the cord remain isolated, but much shifted in their position, coming to assume in the highest types the character of rods or pyramids of gray matter embedded in the cord. From the entire nerve-axis fibres pass out and are regularly paired, bringing all parts of the body into close nervous contact by intercommunicating nerve-fibres. In *Amphioxus* only the foreshadowings of the arrangements in higher vertebrates may be seen, but the work of Edinger, Kupfer, His, Retzius, and others has shown that most of the structures of the higher animals are found in this low animal in their simplest forms. In the fishes the brain-hemispheres begin to show more advanced stages. The olfactory nerves and bulbs are very prominent. The optic lobes are small, and the presence of a cerebellum is only indicated. In the amphibians, frogs, toads, salamanders, and the reptilians, snakes, etc., the hemispheres are prominent, and a certain degree of complexity of their minute anatomy is evident. The olfactory lobes are still very large, the cerebellum is very poorly developed, and the spinal cord is extremely simple in structure. The pyramidal tracts are not yet characteristic, but fibre-systems are present, passing from the brain to the cord. The spinal cord remains, however, a somewhat independent organ. In the fishes a sensory spinal fibre-system is probably found. With the birds the more characteristic higher-type brain begins to show itself. Its hemispheres have convolutions resembling somewhat in type those of higher forms. The cerebellum is well developed, and shows the characteristic histological structure of more highly evoluted animals. The spinal cord has well-marked pyramidal motor tracts and a differentiated sensory tract. Finally in the mammals practically all of the structures of the human brain are present, although great variations in the size and complexity of the different parts are to be noted. The brain of man differs from that of the lower animals not so much in the matter of size or weight, although it is relatively large and heavy, as by reason of the almost infinite number of connecting or association fibres. These bring all parts of the nervous system into relation, and permit of the endless variety of thought-constructions that go to make up man in his social conditions. In man, moreover, the hemispheres become relatively much larger than the other parts of the brain, and by reason of their many fissures and convolutions make very wide areas in which countless nerve-cells develop. These hemispheres lie over the other parts of the brain. Throughout the entire animal series a certain evolution in localization takes place. Functions which in lower forms are generalized, and can be assumed by any part of the nervous system, in higher animals become specialized, and are relegated to certain particular organs. Thus it is found that in animals in which the sense of smell is extremely important large olfactory lobes are present; and conversely, animals so situated as not to possess certain organs do not develop certain nervous structures. The eyeless animals of caves have usually small optic lobes; the footless dolphins show small pyramidal (motor) tracts in their spinal cords, etc.

In the nervous system are illustrated very thoroughly the general principles of evolution as seen in its broadest aspects, and the development of the richly convoluted and highly complex brain is the index of the superior mental power of the human race. Consult: Beaunis, ‘L'Evolution du Systeme Nerveux’ (1890), which gives a simple account of the general structural changes in the nervous system throughout animals; Edinger, ‘Bau der Nervösen Centralorgane’ (6th ed. 1903); Cajal, ‘Les Nouvelles Idées sur la Structure du Systeme nerveux’ (1895); Koelliker, ‘Handbuch der Gewebelehre des Menschen’ (1896), for minute anatomy. For the most comprehensive works on the human nervous system, Dejerine, ‘Anatomie du Systeme Nerveux’ (1900), and Van Gehuchten, ‘Anatomie du Systeme Nerveux’ (3d ed. 1903). See ANATOMY; BRAIN.

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Nervous System, Traumatic Affections of the. Accident and injury play a large role in the development of affections of the nervous system. These forms of disease, or disorder, may be grouped under two general heads, organic affections and functional affections, the dividing line between some forms of each being very obscure. Affections of the peripheral nerves are among the commonest of the organic accidental injuries. Thus, pressure of a crutch under the arm, the use of the crutch being necessitated by a broken leg, often produces a paralysis of the muscles of the arm. Other forms of peripheral palsies result from wounds of the arm and forearm whereby a nerve is cut, either by an instrument that penetrates the skin or by a splinter of bone from a fractured limb. Paralysis of one half of the body (hemiplegia) sometimes follows severe injury to the head. Such injuries frequently result from football accidents, from falls during drunkenness, from collisions, being thrown from a horse or vehicle, etc. Fractures of the spinal column often result in death, due to injury of the spinal cord; and if death does not result immediately, paralysis of the entire body below the site of the fracture (paraplegia) results. Lesions of the nervous system resulting from gunshot injuries are very common in times of war and constitute a very important chapter in military surgery. Such injuries usually cause either paralysis of different parts of the body, resulting from division of the nerve-fibres, or severe neuralgic pain due to irritation of the sensory nerves. Occasionally epilepsy is caused by accidental injury to the head, especially injury to the child's head during birth. One of the most interesting chapters in the history of traumatic affections of the nervous system is that of «traumatic neurasthenia,» or «traumatic neuroses.» These have been frequently classified under the head of «spinal concussion,» «railway spine,» «Erichsen's disease,» etc. The most characteristic features of this affection were pointed out by Charcot, who allied it with neurasthenia and hysteria; and at the present time it is usual to speak of three classes of these conditions: (1) affections of a purely surgical nature; (2) traumatic hysteria; (3) traumatic neurasthenia. In a severe railway accident, for instance, any one of these forms may be present, and combinations of two or three are not unusual. The neurasthenia which may arise from such accidents is of a nature precisely similar to neurasthenia due to other causes. It is characteristic, however, that many of these neurasthenics recover when damages are collected from the railroad; some, however, persist and there is no doubt that the affection is a real one in many instances, and not simulated. At the same time, it should not be forgotten that many people grossly exaggerate their symptoms; moreover, there are certain parasites in the community who make it a business to sue railway and other corporations on the basis of alleged traumatic disease. Hysteria resulting from traumatism is of the same nature as ordinary hysteria, and is governed by the same general laws of this disease when due to other causes. It is important to emphasize the fact, not only to the layman, but to the professional man, that traumatic neurasthenia and traumatic hysteria are real diseases, and that their consequences may be serious and disabling. Each case needs special treatment, and in all cases in which litigation occurs there should be thorough investigation by competent medical experts, as well as trial by jury to determine the degree of disability on its merits. Consult: Peterson and Haines, ‘Text-book of Legal Medicine’ (1904); Bailey, ‘Accident and Injury.’

Nervousness. If one were to ask half a dozen persons calling themselves nervous to define what they mean by their nervousness, he would find it hard to get thereby a general and comprehensive definition, for each would fall to describing his particular variety of nervousness. The nervous business man feels in a perpetual hurry. He is impatient and restless while waiting for his car or for his luncheon. He eats quickly, talks rapidly, and when he has a chance to rest he fidgets. At night he tosses and thinks for an hour or two before sleeping; but, instead of thinking consecutively his ideas flash around in a distracting circle that leads to no conclusion. The nervous woman of leisure starts at the slightest noise; she feels bright and like herself during any exciting pleasure, but has the blues and is morbidly depressed when life is dull. She has headaches, and moods in which she wants to scream. The overworked nervous student broods over his studies, cannot fasten his attention on his work, and what he has once known well he fears he has forgotten, and he expects to fail in his examinations. The young girl who is nervous about playing or reciting before an audience finds that her heart beats furiously; her hands are icy and stiff, and when she sits down at the piano the notes dance wildly before her eyes. The nervous mother or housekeeper is troubled by her irritability. She is distracted, forgets where she puts things and cannot remember what she started to do. At night she excuses her «good cry» as a relief to her nerves.

All such people agree that nerves are the bane of modern civilization, and it seems to be taken for granted that nerves are a new development of the human anatomy. When national comparisons are made, Americans will generally admit, in fact claim, that they are the most nervous of nations. To be nervous seems to imply the possession of a finer sensibility, a greater responsibility in affairs, and a more strenuous and enviable mode of living. Hence the afflicted dwell with relish upon their symptoms, with a lurking contempt for such as do not manifest the like.

To have nerve, however, is quite a different thing from having «nerves.» Nerve implies the ability to bring all one's powers under control of the will, to keep steady in trial and danger, calm when others are in panic, and buoyant through any crisis. This modern use of the word nerve and the common supposition that the nerves which play such pranks with man's mind and temper and disposition are all in some way under control of the will illustrates the vagueness of general knowledge concerning the nervous system and its relation to nervousness.

The absolute control of man's nerves is no more a thing of his will than is the act of sneezing. The power that he calls his will is but the steadily directed training of portions of his nervous system to act in a desired way according to certain decisions. The most pitiful sight in life is a man who «has no will,» who has noble impulses and high desires with no disciplined nervous machinery to carry them out. The men and women who are known to have that will power which carries them through ordeals, and who are productive in their activities, are those who have been accustomed to «do noble things, not dream them all day long.» As all success in life, as well as every pleasure of mind or body, depends on a well-conditioned nervous system, it is a matter of highest moment to know how to preserve, train, and care for one's «nerves.»

Not every man is born equal in his nervous equipment. Some inherit an excellent nervous system, which they may dissipate with unwise living, or may husband and improve. Others have very little vigor of the nervous system, but by careful training and right living they spend only what nervous force they can spare. With a poor heritage, in the strenuousness of city life, and sharing the prevalent ignorance concerning the nervous forces, a man may feel that by excessive work he is making a brave and noble struggle to succeed, when in reality he is spending his nervous capital, and at 40 will be a wreck. The nervous capital is the quality of nervous energy with which one was born, plus the quality he has gained by training. The question of quantity concerns only the average amount of nerve-work one is able to do in a day without fatigue too great for recuperation.

Every spoken or written word, every plan, every carefully executed order that takes thought, every act of attention, and every bit of creative work means expenditure of nervous energy. Rest, sleep, recreation, and fresh air enable the nervous system to renew in a few hours all that it has lost, with ability gained to do the same kind of work the next day with less of voluntary effort, and consequently less fatigue.

The slowly accumulating nervous power that shows itself in increased accuracy and judgment makes men successful and prevents nervousness. Too many girls and boys, in their student days, in their social or university careers, in their early business ambitions, are so anxious to succeed quickly, that they spend more of their nervous capital than can come back to them in the time allowed for sleep and recreation, until finally they find themselves nervous bankrupts. «Time is money» may well be paraphrased, «Nerves are money,» and they are also power and success.

In no part of the body are the effects of heredity so marked as in the nervous system, but most conclusions regarding this are based on *post-hoc* reasoning. It can never be shown that, because two highly nervous, excitable, or hysterical persons marry, their children must have the same strain; for a healthful environment and good physical and mental training can overcome the tendency to lack of nervous control. Neither can it be assumed that the children of two calm, well-balanced persons, of good nervous force, will grow up to be like their parents; for disease, overwork, and dissipation may ruin the best nervous organization. The chances are, however, that the same environment and training which have helped to exaggerate the nervousness of parents will also surround and affect their children, as it is equally probable that the wise and healthful training which has developed good nervous stock in parents will be passed on to their offspring.

Neurologists term this inborn tendency in the nervous system to give way under stress, the neuropathic tendency, or nervousness. They mean that, while no actual nervous disease is inherited, yet under the stress of habits and environment the nervous system fails to meet the demands made upon it. A man with this neuropathic tendency who drinks even moderately usually becomes nervous and less capable, where another might suffer almost no ill effects. Two students may smoke cigarettes incessantly, and one develop shaky muscles, an irritable heart, dyspepsia, and nervous breakdown; the other feeling no ill effects. A certain percentage of telegraphers, typewriters, writers with the pen, pianists, tailors, ballet-dancers, etc., develop occupation-neuroses (see OCCUPATION, HYGIENE OF), with muscular cramps and consequent disability, by reason of the extra burden put upon a deficient nervous inheritance.

The inheritance of a sound nervous organization means that a child is born with sufficient nervous energy to control its body and not so much as to stimulate it to excess. Perfect health in a mother during pregnancy means a valuable asset for her child's nervous system. Shock, fatigue, infectious disease in the mother may even stop the child's nervous development, and cause the babe to be born an imbecile. A normal infant at birth has the mechanism of its nervous system definitely laid out though wholly undeveloped. All growth comes through repeated experiences, which begin with the first day of life, and on that day the training of the nervous system should begin. Clock-like regularity in the hours of eating and sleeping is the first step in the healthful training of an infant's nervous system. By control of the involuntary start on hearing loud sounds, a child may be so trained as to be spared much nervousness when he grows up. Parents, by word and example, should teach their children to work with concentrated attention in spite of distracting sounds. It is the total lack of training that makes it impossible for so many nervous people to inhibit their reflex actions. They tremble, shudder, start, exclaim, are disturbed in their work, wakeful at night, simply because they have always allowed their nerves to respond to trifling stimuli, instead of inhibiting the responses. All mechanical actions, all brain actions tend by repetition to become automatic. The muscle-worker rarely suffers from nervousness. But in the brain-worker the establishment of new connections brings great nerve-tire. So the expenditure of nervous energy in forming new nerve-connections, receiving new impressions, etc., tends to make the most agreeable occupations exhausting. Let it be remembered by the older generations, and taught to the younger, that the training and economizing of nerve-force are vitally important to health and efficiency, and that the great workers achieve their ends by that very quality of nervous energy which, if dissipated, degenerates into nervousness.

SMITH ELY JELLIFFE, M.D.,
Editor 'Journal of Nervous and Mental Disease.'

Nesbit, nĕz'bĭt, **E.** See BLAND, EDITH NESBIT.

Nesbit Moor, in British history, a battle fought 7 May 1402, between the Scotch, under Sir P. Hepburn, and the English, under the Earls of Percy and March. The Scots were defeated, their leaders killed, the most of them taken prisoners.

Nesr, in Arabian mythology, an idol in the form of a vulture, worshipped by the tribe of Hemyer.

Ness, Loch, lŏʜ nĕs, Scotland, a lake of Inverness-shire, on the line of the Caledonian Canal. It is long and narrow, stretching southwest and northeast about 22 miles, with a fairly uniform breadth of about a mile, and a maximum depth of 780 feet. Its northeastern extremity is about six miles from Inverness. Fort Augustus is situated at its southwest end. It occupies the centre of the valley of Glenmore, and is enclosed by steep and often finely wooded hills, about 1,000 feet high. The outlet is by the Ness into the Moray Firth.

Nesselrode, nĕs'sĕl-rō-dĕ, **Karl Robert,** COUNT, Russian statesman: b. Lisbon 14 Dec. 1780; d. Saint Petersburg 23 March 1862. His father was Russian ambassador to Portugal, and the son also, at an early period, entered the diplomatic service, and in 1807 was made councillor of the Russian embassy at Paris. He succeeded in detaching Russia from the Austrian alliance, and was present at the important conferences between Napoleon, Alexander I., and the German princes, at Erfurt in 1808. He gained immense influence over Alexander's mind; was made chancellor of the empire, and dictated its foreign policy; followed the emperor to France in 1814, and signed the Quadruple Alliance; and took part in the Congress of Vienna. He was one of the chief formers of the Holy Alliance, which made Russia virtually supreme in Europe. He became minister of foreign affairs in 1816, and took part at the congresses of Aix-la-Chapelle, Troppau, Laibach, and Verona. Nesselrode's influence was considerably limited under Nicholas I., and he strove in vain to avert the war which broke out in 1853. After the accession of Alexander II., and the signing of the Treaty of Paris in 1856, Nesselrode retired from the foreign office, but continued in the chancellorship, and also held a seat in the Ministerial Council. His autobiography appeared in 1866.

Nessus, nĕs'ŭs, in Greek mythology, a centaur whom Hercules ordered to carry his wife Deïanira across a river. The centaur ill-treated the woman, and Hercules shot him with a poisoned arrow. Nessus, in revenge, gave Deïanira his tunic, saying whomsoever she gave it to would love her exclusively. Deïanira gave it to her husband, who was poisoned and after enduring agony, threw himself on a funeral pile and was consumed.

Nestle, Christof Eberhard, German scholar: b. Stuttgart 1 May 1851. He was educated at Tübingen and Leipsic and was tutor at the former university 1877–80, and professor at Ulm 1880–90, and again, 1893–8. Since 1878 he has been professor at Maulbronn, Würtemberg. He has published 'Die israelitischen Eigennamen' (1876); 'Psalterium Tetraglottum' (1879); 'Syriac Grammar' (Lat. 1891, Ger. 1888, Eng. 1889); 'Septuagintastudien' (1886–99); 'Marginalien und Materialien' (1893); etc.

Nes'tor, Russian monk and author, of the 11th century. He was of the Cave Monastery at Kiev, and wrote an account of the martyrs Boris and Gleb, and a 'Life' of Theodosius, a former abbot of his monastery. For a long time he was regarded as at least the original author of the so-called 'Chronicle of Nestor,' the most important of the early authorities for Russian history, but later investigations have proved the supposition erroneous. The 'Chronicle,' perhaps the work of Abbot Silvester, gives an account of Slavonic history in the form of annals for the period 850–1110 A.D., the last 40 years being from a contemporary viewpoint. For the preceding time, use is made of the Byzantine historians, the Bible, the Apocrypha, traditions, biographies and legends of saints and the records of monasteries, etc. There are various translations into German by Schlözer (as far as 980 only); in his 'Russische Annalen' (1802–9); into French by Léger (1884).

Nestor, in Greek legend, one of the heroes at Troy distinguished for his great age, experience, and wisdom, as well as for his mild and persuasive eloquence. These are the qualities Homer has attributed to him in the Iliad. He was the son of Neleus, king of Pylos, and was born at Gerenia, in Messenia. He succeeded his father as king of Pylos. In his youth and manhood he distinguished himself by many bold exploits, and early acquired the reputation of a prudent counsellor and persuasive orator. Though he had lived through two generations when the expedition to Troy was undertaken he nevertheless took part in it, and conducted the forces under his command in 20 vessels to

Troy. On account of his extreme age he did not take a personal action in the encounters before the city. The part which is attributed to him in the Iliad is that of an experienced counsellor. He had several sons and daughters, but they are not distinguished in history. After Nestor had outlived three generations he died quietly at Pylos, where, in the time of Pausanias, the inhabitants pretended to distinguish his dwelling and his grave.

Nesto'rianism, the theory of the Incarnation of Jesus Christ taught by the Nestorians or followers of Nestorius. Nestorius was a presbyter of Antioch who in 428 was made patriarch of Constantinople and was charged with teaching that there were two persons in Jesus Christ, of which one is the word of God, and the other the man Jesus, and that Mary his mother ought not to be styled mother of God (Theotokos) but mother of Christ (Christotokos). Cyril, patriarch of Alexandria, accordingly accused him of teaching the dual personality of Christ, a view which was formally condemned and anathematized by the Third Council of Ephesus, 431. He was deposed, driven from one place to another and met with a miserable death in 440. The controversy lasted for two centuries. In 435 the Nestorians who had organized themselves into a church in Syria took refuge from the persecutions of the Orthodox church in Persia, Mesopotamia and Arabia, assuming the title of Chaldæan Christians. At the Council of Seleucia (498) the Persian church clearly formulated this dogma in opposition to the teaching of the Catholic Church. These views flourished in Antioch, Edessa and Nisibis, and their adherents were the fosterers of learning in history, philosophy and medicine, and under the Arabian domination were often raised to high posts in the government. Tamerlane afterward desolated the Nestorian Church throughout almost all Asia, so that only a remnant escaped to the mountains of Kurdistan. Under Popes Alexander III., Innocent IV., and Nicholas IV., some attempt was made in the 16th century to effect a union with the Roman Church, in consequence of which the United Nestorians separated from the main body of the Chaldæan Christians. These separatists are numbered at some 20,000. They acknowledge the primacy of Rome, but use a Greek liturgy. Their patriarch has his see at Diarbekir, Asiatic Turkey. The Non-United Nestorians in Mesopotamia, Persia and Syria celebrate the sacraments of baptism and the Lord's Supper but do not teach Transubstantiation; they do not impose celibacy on their clergy; they number some 150,000 souls. The Nestorians of India are called Christians of Saint Thomas; in 1599 they acknowledged the primacy of the Roman see. Consult: Badger, 'The Nestorians and their Rituals' (1852); Rae, 'The Syrian Church in India' (1892).

Nesto'rius. See NESTORIANISM.

Nests of Birds, the receptacles prepared by birds for the holding and security of their eggs and young. The offspring of birds, as of all the animals lower in rank than they, begin life in the very immature state we call eggs. Those of lower animals are, however, protected from harm, when protected at all, by being buried under water or in the ground, or otherwise concealed and shielded. (See EGG; NIDIFICATION.) The eggs of birds, however, are few in number, larger in proportion, and more advanced in development than those of fishes, amphibians or reptiles, and are encased in very fragile shells, the rupture of which would be fatal to the enclosed embryo; they are never (with a single exception) buried out of harm's way; and they require a comparatively high degree of warmth, continuously applied, in order to mature successfully into living and energetic young. (See EGG.) To meet these complicated conditions of success great care is necessary on the part of the parent-birds; and the necessity for this care increases in proportion to the superiority of organization and development of the bird,— a matter of wide range in the class. The young of the higher forms, as hawks and thrushes, would inevitably perish under the limited care that suffices for such lower forms as the seafowl. In this view birds are divisible into two classes: first, those whose young are developed within the egg, that is before hatching, to such a point that they are able as soon as freed from the shell to run about, pick up their food and to a great degree take care of themselves; second, those hatched before they have reached this state of advancement, and which hence must be fed, protected and guarded by their parents until they have completed their development to the point of self-care. Parental preparations for the former need have regard only to the proper incubation of the eggs; for the latter it must be extended to the safety and comfort of the young for a period after they have hatched greater or less according to their helplessness, which varies with the degree of organization. It is among birds of the highest organization, therefore, that complete and elaborate nests are alone to be found, because there only are they required as cradles and homes for the young. The lowest seafowl, such as penguins and auks, make no nest whatever, depositing only a single egg on some cliff-ledge or sea-islet, almost inaccessible to enemies, and covering it with their warm bodies until the young one hatches, when it is immediately ready to go into the water and fish for itself. The great company of shore-breeding birds, gulls, sandpipers, etc., need do nothing more than scrape a smooth hollow among the pebbles or sea-wrack where their eggs may lie close together and not roll or be blown away. The waterfowl — rails, ducks, pelicans and others,— seeking the greater seclusion of marshes and swamps, must do a little better, making a firm raised bed of earth with a rim around it, or else a platform of reeds, etc., to keep their eggs out of the mud or water. Some of these, as the herons, cormorants and the like, have learned to make their homes in bushes and trees, and these are likely to be rather more substantial than those on the ground, to prevent their falling to pieces in the swaying of the branches, or dropping the eggs over the side or through the bottom. Similarly the great tribe of ratite, limicoline and game-birds, which breed inland on the ground, do not make nests in such sense as are those of the song-birds, but mere beds for the eggs, since these are all *Precoces,* or *Nidifugæ,* that is, of those whose chicks run about as soon as they hatch.

The higher families of birds, however, called

Altrices or *Nidicolæ*, must safeguard and nourish their young for a period after birth from the egg, and these must make a home for them which shall be durable and of such a form and finish as shall protect the helpless young from bad weather, observation and attack, and prevent their falling out. These objects are attained with a varying degree of success, but in many cases seem to be almost perfectly accomplished, and the nests resulting have added to them the finish of great beauty. Some birds' nests are marvels of skill, ingenuity and adornment; while others, perhaps made by nearly related species, are rude or slovenly.

Classifying Nests.— Several of the earlier writers on ornithology have attempted to classify birds according to their modes of nest-building. Such attempts are not without value, but they are purely artificial and of no use to the systematic ornithologist. The classification of nests may take account of their situation, means of support, shape, materials, or other characters, or of two or more of these. Taking the first-mentioned consideration as a basis we may group birds into miners, such as the kingfisher and the sand-martin; mound-builders, like the brush-turkey and scrub-pheasant of Australia; masons, which use a sort of mortar of earth or clay, including several swallows and allied birds, etc. One of the most distinctive categories is that of the borers, such as the woodpeckers and their relatives, which carve out tunnels and chambers in the trunks of trees as breeding-places. Many of the terms employed in nest classification are useful for descriptive purposes. Such are platform-nests, basket-nests, pensile nests, etc., or, as names of birds, weavers, tailors, felt-makers, etc. As a general rule birds of the same family or lesser group will agree pretty well in their style of nidification; but there are many exceptions, as for example, the North American tyrant-flycatchers.

Methods of Construction.— Birds choose for their nests the material of that kind to which they are habituated which lies nearest; and if it cannot be found will seek a good substitute, so that the nests of birds whose specific range covers a wide region will be found varied greatly and often much improved in some localities. Similarly the builders are likely to change the site when necessary, breeding in trees in wooded regions and on the ground or rocks where trees are absent. In this way certain birds have greatly modified their nesting-habits since the civilization of their habitats — notably the swallows and swifts which all over the world abandon, as a rule, their natural breeding places in hollow trees, or about rocky cliffs, and make their nests under the roofs of farm outbuildings or in bird-boxes. This adaptability extends to each species, where the nests of closely related birds vary considerably. In many families, as, notably, in the *Fringillidæ*, some species nest on the ground, others in bushes or trees; and it is hard to say which is to be considered the normal method.

Birds' nests are usually in the form of bowls, and may be formed of sticks, or weed-stems, or coarse grass, and form an immense mass, as is the case with the birds of prey, crows, or herons, one of which, the umbrette of Central Africa, makes a home large enough to fill a dumping-cart. Such great structures are likely to be used many years in succession; but few small nests outlast the winter. The hollow bed in the centre is formed by a lining of lesser and smoother substances. Small birds naturally use finer materials, and the character of the structures varies with the characteristics and habits of the birds. Some are made almost wholly of twigs, others of grass blades, others of flexible ribbons of such bark as that of the grape-vine, others of shreds of hempen fibre torn from the milk-weed and similar plants, others of a matted felt formed of the down of cat-tail flags or of ferns. Some are made in whole or in part of mud, and plastered upon rocks, either supported upon a ledge or projecting glued to the face of a cliff like a hollow bracket. Of this shape are the nests of many swifts, some of which are composed almost wholly of glutinous saliva, as is the case with that of the edible swift mentioned below. Some of the rudest nests externally are beautifully soft and smooth within; while others are exquisitely finished and adorned outside as well as in; or are intricately woven, as are the pensile hammocks of the vireos, the pouches of the Baltimore orioles, European titmouses and others, and the leaf-sewn nests of the tailor-birds and many humming-birds. In most cases the female is the architect, while the male is permitted to do little but bring materials which are often rejected by the fastidious builder. While most, especially of the smaller kinds of birds, separate into pairs and seek secluded places for their homes, others breed gregariously, as is the custom of many seafowl and most herons, pelicans, etc. Some of the land-birds, as the swallows, betray a tendency toward this; but the most remarkable case is that of the African social weaver-birds (q.v.), which actually build a roof in common, beneath which each pair of the flock establishes its individual dwelling. This strictly community life does not occur elsewhere among birds, although cases of commensalism are occasional.

Edible Nests.— Few birds' nests serve any human utility, though many are utilized by other members of the animal kingdom. One, however, is valuable as food. This is the nest of the salangane (*Collocalia fuciphaga*) and other species of swifts or swiftlets, found in the Malay Archipelago, used as an article of luxury among the Chinese. It has the shape of a common swallow's nest, is about the size of a half teacup, is found in caves, particularly in sea-cliffs, and has the appearance of fibrous gelatine or isinglass. It is composed of a mucilaginous substance secreted by special glands, and is not as was formerly thought made from a glutinous seaweed. The caves in which these swifts dwell in crowds are particularly abundant in Sumatra and Borneo, especially near the north end of the island, and are in most cases the property of wealthy owners, who get a large annual income from the hazardous occupation of securing the nests, which can be done only by climbing about the interior of the great sea-caves, holding torches and raking off the nests into little bags hung upon the end of the pike-poles. The best, which are whitish in color, and almost free from any mixture with the pure glutine from the glands in the mouth of the bird, are worth $10 to $15 a pound.

Among works dealing with the subject of birds' nests we may mention Rennie, 'Architecture of Birds' (1831); Wood, 'Homes without Hands' (1865); Dixon, 'Nests and Eggs of British Birds' (1893); Newton, 'Dictionary of Birds' (1893-6) and Wallace, 'Darwinism' (1889).

Ernest Ingersoll.

Net, an open fabric made of hemp, jute, flax, and sometimes of cotton and other fibres. The open spaces are called meshes, and in order that these may retain their shape and size the fibres of which the net is made have to be knotted at the intersections. Nets were formerly made only by hand, but an ingenious kind of loom has for many years been in use by which the operation of netting can be performed mechanically. Nets are used for a great variety of purposes, but chiefly for fishing. The three chief kinds of nets used in fishing are the seine, the drift-net, and the trawl. The first two are very long in proportion to their breadth, and differ from one another only in the manner in which they are employed. The seine has a line of corks along one of its long borders, and a line of leaden weights along the other; so that when the net is thrown into the water it assumes a perpendicular position. The drift-net is not loaded with lead, but floats in the water. The trawl, again, is dragged along the bottom by the motion of the boat. Nets are also used to catch birds and animals, to protect crops from birds, the blossoms of trees from frost, etc. Wire nets or netting is also used for domestic purposes.

Netherlands, Kingdom of the, frequently called **Holland,** a northwestern European country with a north and western coastline of 470 miles on the North Sea, its eastern frontier bounded by Germany, and its southern by Belgium. It comprises the northern and smaller half of the numerous provinces formerly combined under the name NETHERLANDS or LOW COUNTRIES, part of which is now included in Belgium. It received its general English name of HOLLAND from its coastal provinces North and South Holland. From north to south the country has an extent of 150 miles, with a breadth from west to east of 120 miles throughout and a total land area of 12,648 square miles.

Political Divisions.—The Netherlands at the present day has nearly the original limits of the Seven United Provinces in the 16th century. The modern provinces are given in the accompanying table:

PROVINCES	Area in sq. miles	Population 1901
North Brabant	1,980	566,551
Gelderland	1,965	580,691
South Holland	1,166	1,194,463
North Holland	1,070	1,001,799
Zeeland	690	219,832
Utrecht	534	259,834
Friesland	1,282	345,004
Overyssel	1,291	343,924
Groningen	790	305,781
Drenthe	1,030	153,281
Limburg	850	292,072
	12,648	5,263,232

The Duchy of Luxemburg (q.v.) was under the sovereignty of the king of Holland, until the death of William III. in 1890 dissolved this union. The most densely peopled province is South Holland (981 per sq. m.), and the least densely peopled is Drenthe (144).

Topography and Physical Features.— The Netherlands forms the most characteristic portion of the great plain of northern and western Europe. From the middle of Belgium, a few miles northeast of Brussels, the country becomes a dead level, extending in monotonous, sandy flats, through Hanover, Jutland, Holstein, and, with little interruption, through Prussia into Russia. The lowest part of this immense level, and that which has most recently emerged from the sea, is the country lying between the mouths of the Schelde and Ems. Within this distance the Rhine, joined by the Maas, Yssel, and other rivers, enters the sea through a number of arms, and sluggish, winding channels. This delta in early ages was evidently liable to perpetual change of form, as new mud-banks were deposited, old channels being blocked up, and new ones formed. In addition to this the river floods, in forming a domain of alluvial deposits, had to contend with the sea, which washed away the accumulations of mud, or covered them with sand, according to the vicissitudes of weather and season. The soil of the Netherlands shows everywhere the proofs of this struggle between the ocean and the river, in the alternation of salt and fresh water deposits. It therefore became a problem of existence with the early inhabitants to secure the natural permanence of their territorial possessions, by embankments high and strong enough to protect them under ordinary circumstances from the waves; by windmills on the embankments — a characteristic feature of Dutch landscapes — they worked the pumps which drained the enclosed lands. In consequence, the Netherlands has the appearance of an artificially constructed country, some portions of which are 16 feet below the surface of the sea, and nearly all too low for natural drainage. The whole country is divided by dikes, some of them 60 feet high, which protect portions of land from the sea, lakes, or rivers. These enclosed lands are called *polders*. On the chief dikes are roads and canals also joining the rivers, the canals generally large enough to be navigable. There are no mountains nor rocks in the Netherlands, which is popularly described as a country without mountains, wild trees, or natural springs. The only heights are the sand-hills, about 100 to 180 feet high along the coast of Holland; and a chain of low hills, of similar origin perhaps, which extend from the middle of the province of Utrecht into Gelderland.

The principal coast features are the wide estuaries of the Schelde, and of the Maas, the latter receiving the waters of the Rhine; north of the Maas the Zuider Zee, which was formed by an irruption of the sea in the beginning of the 13th century, and now covers an area of 1,200 square miles. Between the mouths of the Maas and the entrance of the Zuider Zee, a distance of 75 miles, the coast is chiefly formed of sand-hills or dunes, frequently 180 feet high, dreary and sterile to the last degree; and separating, with their broad band of irreclaimable desert, the low fertile meadows on the one side from the waves of the ocean on the other. In a line with these dunes, stretching beyond the mouth of the Zuider Zee, runs a chain of

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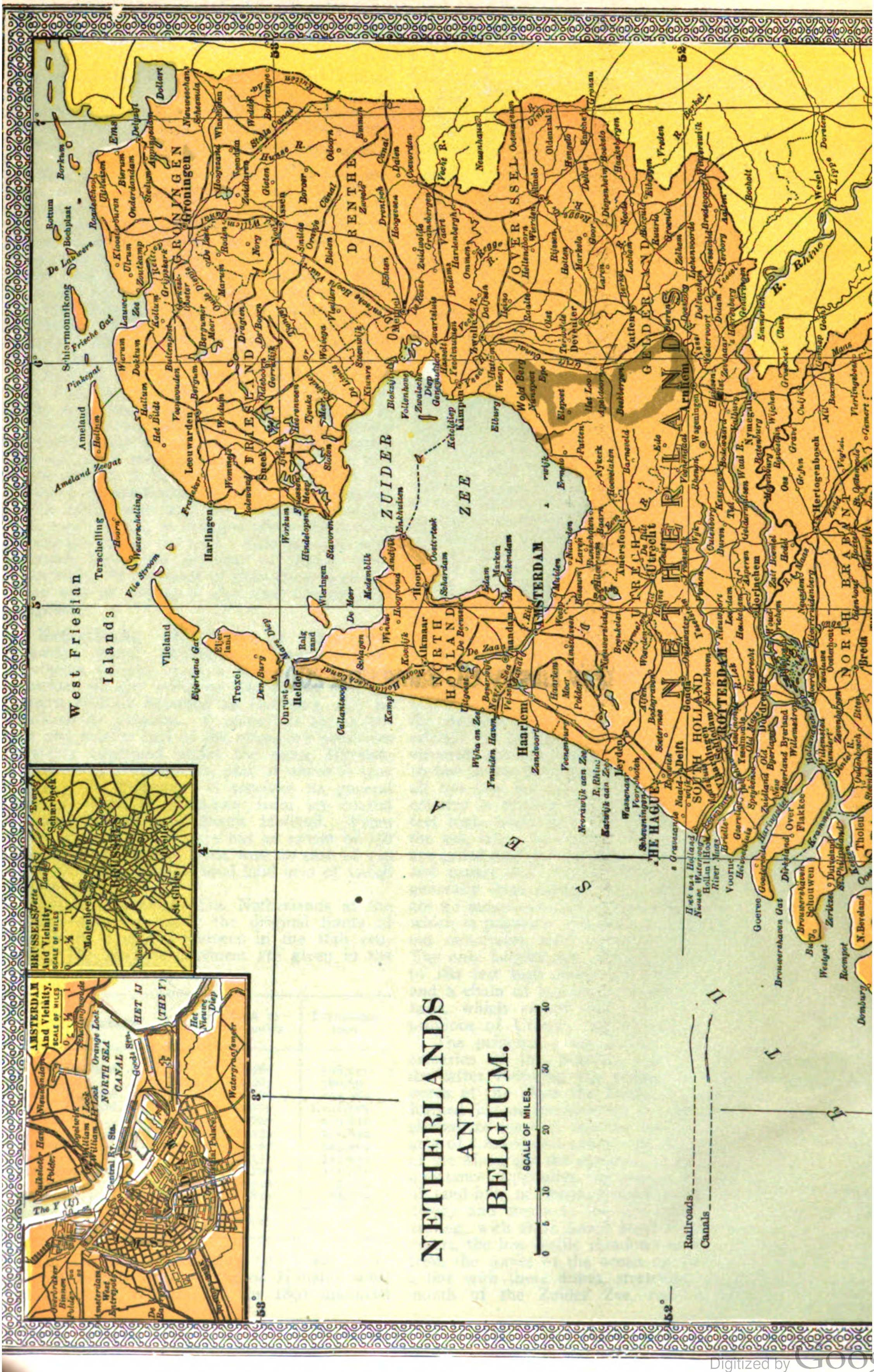
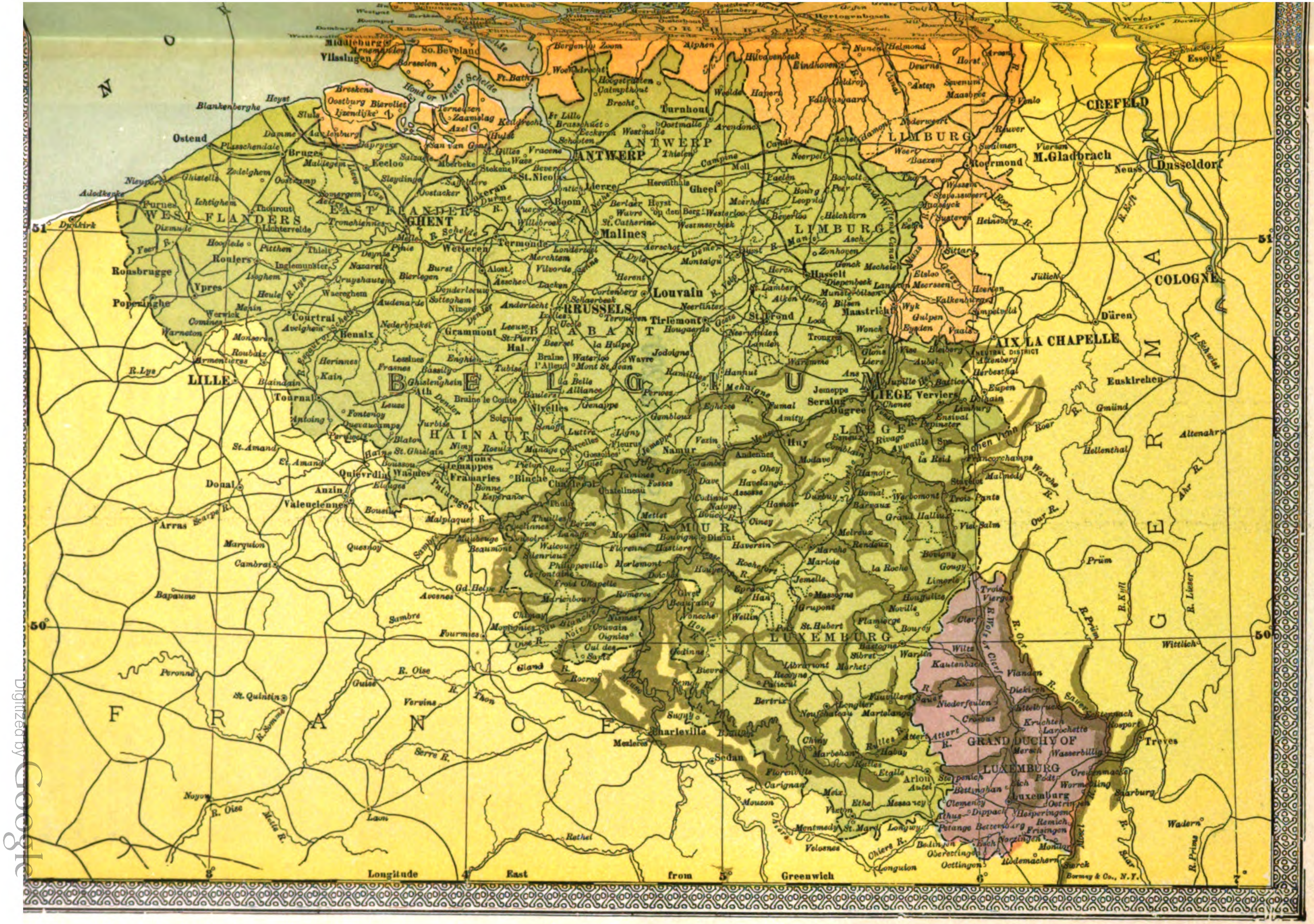


NETHERLANDS AND BELGIUM.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NAMUR
LIEGE
LUXEMBURG
NORTH BRABANT
NEUTRAL DISTRICT
BRUSSELS
ANTWERP
GHENT
LIEGE
Malines
Louvain
Bruges
Ostend
Namur
Mons
Tournai
Courtral
Verviers
Maastricht
Hasselt
Arlon
Luxemburg
LILLE
AIX LA CHAPELLE
COLOGNE
CREFELD
M.Gladbrach
Dusseldorf
Treves
Charleville
Sedan
Valenciennes
Longitude
East
from
Greenwich
51°
50°
3°
4°
5°
6°
7°
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islands, namely, Texel, Vlieland, Terschelling, Ameland, etc., which seem to indicate the original line of the coast before the ocean broke in upon the low lands. The coast of Friesland, opposite to these islands, depends for its security altogether on artificial embankments. The Lauwers Zee, a deep bay on the confines of Friesland and Groningen, also owes its origin to an irruption of the ocean; and again the Dollart, a gulf at the mouth of the Ems, between Holland and Germany, was formed about half a century later than the Zuider Zee, and by a similar convulsion, which is said to have swept away 70 villages and 100,000 people. From the left bank of the Ems extends the Bourtang morass, a vast and irreclaimable peat marsh, partly in Germany, partly in Holland; the Peel, a marsh of like nature but less extent, lies near the left bank of the Maas, on the east side of North Brabant. The work of reclaiming the waste is constantly going forward; in the provinces of North and South Holland alone about ninety lakes have been drained. The principal of these was the Lake of Haarlem, the drainage of which, begun in 1839, was completed in 1852. The draining of large portions of the Zuider Zee has been begun.

Hydrography.— The chief rivers of the Netherlands are the Rhine, Maas, Schelde, Yssel, Vecht, and Hunse. The Rhine is above half a mile wide where it enters the Netherlands; it soon divides, the south and principal arm taking the name of Waal, and uniting with the Maas, while the north arm, communicating with the Yssel, takes the name of Leck; a branch from it named the Kromme (crooked) Rhein, winds by Utrecht to the Zuider Zee, while another very diminished stream called the Old Rhine flows from Utrecht by Leyden, to the sea at Katwijk. The Maas, entering the Netherlands from Belgium, receives the Roer; of the Schelde only the mouths, the east and the west, or Old Schelde, lie within the Dutch boundary. The Yssel and Vecht, flowing from Germany, both enter the Zuider Zee by mouths at no great distance asunder. The Hunse, rising in the Bourtang Marsh, flows through Groningen to the Lauwers Zee. The canals of the Netherlands are collectively more important than the rivers. The chief is the great ship canal, 26 feet deep and 197 wide, from Wijk, on the North Sea, to Amsterdam, and connected by locks with the Zuider Zee, opened in November 1877. This great canal shortens the distance between Amsterdam and the sea to about 15 miles. The North Holland Canal allows large ships to pass between Amsterdam and the Helder, a distance of 40 miles, so as to avoid the intricate navigation of the Zuider Zee; the Winschoten Canal, also for ships, 18 miles long, connects the Dollart with Groningen; the Damster-Diep, of equal magnitude, runs from Groningen to the sea at Delfzijl; another canal connects Harlingen, on the Zuider Zee, with Groningen; the Nieuwer Sluis unites Utrecht with Amsterdam, while the latter city also communicates with Rotterdam. The Dutch canals are much used by passengers, and the slowness of the trekschuyts or boats is compensated in some measure by their punctuality. In winter their frozen surface offers convenient roads to skaters, and they are then traveled over with greater speed.

Climate.—The climate is extremely humid, changeable, and disagreeable; violent winds, with varying temperature, frequently blow from southwest or northwest, and heavy sea-fogs are driven in, which injure vegetation. The mean average annual temperature is 50° F.; 35° in January, and 65° in July; the average annual rainfall is 26 inches. The winter is severe, and the sky is almost always overcast and troubled. The bright days hardly exceed forty in the year. Low fevers visit the marshy districts in autumn, but the dry cold of winter restores the peasant's health. Although the climate is to strangers cheerless and depressing, its prejudicial effects on health are counterbalanced by good food and clothing, and habitual cleanliness; the Dutch give particular attention to these domestic safeguards, and, notwithstanding the ungenial climate in which they live, longevity is not rarer among them than elsewhere.

Agriculture, etc.—Horticulture and agriculture have been developed to a high degree of perfection, although the latter holds a subordinate place in rural industry. The soil consists chiefly of alluvial deposits. Wheat, of excellent quality, is grown only in favored portions of the south provinces. Rye, oats, and buckwheat, with horse-beans, beet, madder, and chicory, are more common crops; and tobacco is cultivated in the provinces of Gelderland, South Holland, and Utrecht; flax in Zeeland and the environs of Dortrecht, and hemp, oilseeds, and hops in various parts of the kingdom. Culinary vegetables are cultivated on a much larger scale for home use, and also for the exportation of the seeds, which form an important article of Dutch commerce. Dutch agriculture atones in thoroughness for what it lacks in extent. The farmers are highly skilled, and to them many of the chief improvements in modern agriculture are due. The culture of flowers, and especially of flowering bulbs, has long been one of the most important industries of the country, and is of ever-increasing importance. The chief centre of this industry is Haarlem, and every year large quantities of bulbs of all kinds are exported to foreign countries. It is in stock, and dairy produce in particular, that the rural industry of the Netherlands shows its greatest strength. Their horses are remarkable for size and strength, and much sought after; and in the number and excellence of their horned cattle the Dutch stand equally high. The poultry-yard is also to the Dutch farmer a source of wealth. Bee-culture is likewise actively carried on, especially in Gelderland and Drenthe. The quantity of cheese and butter brought to market is enormous. About 2,100,000 acres are under culture, nearly 3,000,000 are pasture land, over 150,000 are devoted to gardens and orchards, some 620,000 are forest, about 1,500,000 are uncultivated heath, fully 300,000 are water and morass, and about 125,000 acres are occupied by dikes and roads.

Manufactures and Commerce.— Manufactures have never held a very important place, though the linen of the Dutch Netherlands has long held the first rank. The manufacture of woolen cloth centres in Leyden, Utrecht, and Tilburg. The distilleries of Schiedam are well known; Gouda supplies tobacco-pipes, the best of their kind; and the same praise may be bestowed on the leather, the refined sugar of the Dutch, the pottery, bricks, tiles, glassware, and many other articles intended for continental use. Ship-building and the manufactures subsidiary to that industry are largely carried on in many places. Coal is mined in the province of Limburg, the mines chiefly belonging to the state; 312,717 tons were extracted in 1901, valued at $725,924. The commerce with the Dutch possessions in the East Indies, particularly Java, is of great and continually increasing importance. The total exports of home produce, and imports for home consumption, inclusive of bullion and specie, in 1901 were, imports $818,800,000; exports $697,200,000. The trade is chiefly with Great Britain and Germany.

Shipping, Navigation, and Fisheries.—The mercantile navy of the Netherlands on 1 Jan. 1901, numbered 638 vessels of 40 tons and upwards; 213 steamers of 268,159 tons, and 425 sailing vessels of 78,413; making a total tonnage of 346,572. The vessels entered in 1900 were 12,307 of 9,448,225 tons; cleared, 12,367 of 9,423,156 tons. The herring, oyster, and other fisheries of the North Sea employed 5,851 vessels of all kinds, manned by over 20,000 seamen. The oyster fishery yielded over 1,994 tons of oysters in 1901, while the value of the herring fishery was estimated at $2,956,138.

Railways, the Post-office, Telegraphs, etc.—The total length of railways in the Netherlands is over 1,700 miles, of which 900 miles belong to the state, and the remainder to private companies. The state railways yield an annual revenue of between $1,500,000 and $2,000,000. The post-office is well organized, and also yields a revenue in excess of the expenditure. The length of state telegraph lines in operation is about 3,800 miles. The canals have a length of over 1,900 miles (see paragraph on *Hydrography*).

Money, Weights, and Measures.—The guilder or florin, value 40 cents, is the chief denomination of money. Ten-guilder gold pieces are coined, but silver is chiefly in circulation. The French metric system of weights and measures has been adopted, the principal names being—the kilogram or *pond,* metre or *el,* kilometre or *mijl,* are or *vierkante roede,* hektare or *bunder,* stere or *wisse,* litre or *kan,* and hektolitre or *vat.*

Government, Finances, etc.—The kingdom of the Netherlands, as now constituted, is a constitutional monarchy. The executive power lies wholly with the sovereign, who shares also the work of legislation with the States-General. These consist of two chambers — the upper with 50 and the lower with 100 members — who assemble for deliberation and despatch of business at the Hague ('Sgravenhage). The members of the upper chamber are elected by the provincial states from among the most highly assessed inhabitants of the various counties; the others are elected by ballot, at the rate of one deputy to every 45,000 souls. The government is strong, and the administration in every department is simple and economical. The revenue of the Netherlands during the last few years has averaged about $56,000,000 per annum, and the expenditure about $58,000,000. The debt of the state amounts to about $485,000,000, the interest on which forms the largest branch of the expenditure. The chief items of revenue are yielded by the excise and direct and indirect taxation. The army comprises some 68,000 men (excluding officers) on a war footing, but only about 30,000 altogether in peace. It is formed partly by conscription and partly by enlistment. Substitution was abolished in 1898. The army of the East Indies is about 42,000 strong. The navy comprises 6 first-class iron-clads, 22 second-class iron-clads and cruisers, besides a number of gun-boats, torpedo-boats, training-ships, etc.

Colonies.—In addition to her European territories the Netherlands possesses a wide extent of colonies and dependencies in Asia and America, with which she carries on an extensive commerce, and which contribute materially to her greatness. Her chief Asiatic colonies are the Dutch East Indies (q.v.) comprising Java, Sumatra, part of Borneo, Celebes, and part of New Guinea, with Banca, Bali, Lombok, Sumbawa, Flores, and other islands in the Malay Archipelago; while in America she possesses Surinam or Dutch Guiana, and the West Indian islands of Curaçao, Saba, St. Eustatius, etc. Estimated area 782,863 square miles; pop. about 34,000,000.

Ethnology.—The stock to which the people belong is the Teutonic, the great majority of the inhabitants being descendants of the old Batavians. They comprise over 70 per cent of the population, and are chiefly settled in the provinces of North and South Holland, Zeeland, Utrecht, and Gelderland. The Flemings of North Brabant and Limburg, and the Frisians, inhabiting Friesland, Groningen, Drenthe, and Overyssel, form the other groups.

Population.—As given in the paragraph *Political Division* the total population in 1901 was 5,263,232, of whom 2,603,486 were males and 2,659,746 females. In 1899 there were 52,625 resident foreigners, of whom 31,865 were Germans, 14,903 Belgians, 1,307 English, and 4,550 from other countries. The emigration in 1901 was 1,874, to North America exclusively.

Education.—In respect of education the Netherlands occupy a high place among the nations of Europe. In 1857 a non-denominational primary instruction law was passed, and in 1878 this law was supplemented by another containing more stringent regulations with the view of making primary education more general. In 1900 instruction was made obligatory. An act passed in 1889 diminished public instruction and encouraged private instruction, which is now supported by the state. The cost of public primary education is borne jointly by the state and the communes, the former contributing to teachers' salaries and being responsible for one quarter of the cost of founding or purchasing schools. Above the primary schools are the middle class, secondary, and classical schools, a Polytechnic Institution at Delft, special colleges for agriculture, horticulture, etc. There are four public universities, namely, at Leyden, Utrecht, Groningen, and Amsterdam, and also a private university.

Religion.—A majority of the inhabitants belong to the Reformed Church, and Roman Catholics also are numerous. The members of all religious denominations possess, by the constitution, perfect liberty of conscience and social equality. The census returns of 1899 give the number of Protestants as 3,067,971; of Roman Catholics, 1,798,915; Jews, 103,988; other religions, 17,926; persons not belonging to any religious body, 115,179. The Reformed Church is Presbyterian in government, while the Roman Catholics are ruled by an archbishop and four bishops.

History.—The south portion of the Low Countries belonged at the beginning of the Christian era to Belgic Gaul (see GAUL). The north portion, inhabited by the Batavians and Frisians (see those articles), formed part of Germany. The south portion as far as the Rhine was held by Rome up to 400 A.D., after which it came under the rule of the Franks, as did also subsequently the rest of the country. In the 11th century the territory comprised in the present kingdoms of Belgium and the Netherlands formed a number of counties, marquisates, and duchies corresponding more or less with the modern provinces. By the latter part of the 15th century all these had been acquired by the Duke of Burgundy, and passed to the house of Hapsburg on the marriage of the daughter of Charles the Bold of Burgundy to the son of the Emperor Frederick III. On the abdication of Charles V. in 1556 they passed to his son Philip II. of Spain (q.v.). In consequence of religious persecution in 1576 Holland and Zeeland openly rebelled, and in 1579 the five north provinces — Holland, Zeeland, Utrecht, Guelders, and Friesland — concluded the celebrated Union of Utrecht, by which they declared themselves independent of Spain. They were joined in 1580 by Overyssel, and in 1594 by Groningen. After the assassination of William of Orange, 10 July 1584, Maurice became stadtholder (governor). His victories at Nieuport and in Brabant, the bold and victorious exploits of the Dutch admirals against the navy of Philip II., the wars of France and England against Spain, and the apathy of Philip II., caused in 1609 the peace of Antwerp. But Holland had yet to go through the Thirty Years' war before its independence, now recognized by all the powers except Spain, was fully secured by the peace of Westphalia. In the middle of the 17th century the United Netherlands was the first commercial state and the first maritime power in the world, and for a long time maintained the dominion of the sea. The south provinces alternated between the rule of Spain and Austria till 1797, when they came under the power of the French republic. In 1806 Louis Napoleon became king of Holland, but in 1810 it was incorporated with the French empire. In 1814 all the provinces both of Holland and Belgium were united by the treaty of Paris to form the kingdom of the Netherlands. This arrangement lasted till 1830, when the south provinces broke away and formed the kingdom of Belgium. King Willem I. attempted to reduce the revolted provinces by force; but the great powers intervened, and finally matters were adjusted between the two countries in 1839. The king abdicated in 1840, and was succeeded by his son Willem II. (1840–1849), he being again succeeded by his son Willem III., whose reign on the whole was uneventful. Slavery was abolished in the Dutch West Indian possessions in 1863, slave-owners receiving compensation. In 1873 the Dutch began a war with the Acheenese of Sumatra, and hostilities have lingered on ever since. In 1887 the Heemskerk Liberal ministry passed a bill amending the constitution.

On 23 Nov. 1890, the king died, and was succeeded by his young daughter, Wilhelmina Helena Pauline Maria, under the regency of her mother, the Queen-dowager Emma. The year 1892 was marked by serious disturbances among the unemployed, and in 1893 the Socialists carried on a vigorous propaganda. In 1896 the franchise was extended by a new bill, which received the regent's assent. Besides the unsuccessful war against the people of Acheen, in Sumatra, the Dutch in 1894 had to face also a revolt in the island of Lombok. A Dutch force met with a serious disaster here, but soon afterward General Vetter re-established the authority of the Netherlands. In 1898 Queen Wilhelmina attained her legal majority, and formally took up the reins of government. The most notable event of 1899 was the meeting of the great Peace Conference at The Hague. (See HAGUE CONFERENCE.) In 1900 primary education was made compulsory by law. In Feb. 1901, the queen married Prince Henry of Mecklenburg-Schwerin. Consult: Amicis, 'Holland' (1893); Bernard, 'La Hollande Geographique, Ethnologique, etc.' (1900); Havard, 'In the Heart of Holland' (1880); Meldrum, Holland and the Hollanders' (1880); Motley, 'The Rise of the Dutch Republic' (1858), and 'History of the United Netherlands' (1869); Wood, 'Through Holland' (1877).

Netherlands, Language, Literature and Science of the. The literary language of the kingdom of the Netherlands is in English called Dutch, but by the people themselves is called Hollandsch or Nederduitsch, that is, Low Dutch. This name it receives in opposition to the Hochdeutsch or High Dutch, the literary language of modern Germany. Closely allied to the Dutch, so closely indeed as to be distinguished from it only by some orthographic and other minor differences, is the Flemish (Vlaemisch) language, spoken partly in the kingdom of Holland, but mainly in the Belgian provinces of East and West Flanders, Limburg, Antwerp and South Brabant. (See FLEMISH LANGUAGE AND LITERATURE.) Both languages belong to the Low German group of the Teutonic or Germanic branch of the Indo-European family of languages. The two languages, or rather dialects, are in fact in their early history identical and the term Flemish is applied, on the one hand, to the original form of both dialects and to the literature produced in it before it separated into these dialects; and on the other hand to that one of the two dialects which is still spoken in the parts above mentioned, and to the literature produced in it. It is only in this latter application of the term that the Flemish language and literature can be noticed separately. The non-literary Low-German dialects spoken in the Netherlands may be divided into the Frisian, an idiom which is gradually disappearing (it has a small literature — see FRISIANS); the Guelders dialect, or the so-called Lower Rhenish; the Groningen dialect, to which also belongs the Over-Yssel dialect, bearing a considerable resemblance to the German.

The common parent of the modern Dutch and Flemish was at one time supposed to be a development of the Old Frisian, but the general view at the present day appears to be that the characteristic forms of the language of the Netherlands are at least as old as those of the Old Frisian, and that both languages are separate developments of a still older original. The Dutch language resembles the German in its vocabulary and syntax, but is considerably simpler in its accidence. Its vowel sounds are broader than those of the Germans, and its gutturals harsher. It possesses the same power of forming compound words from native materials as the German, and even to a greater extent, for while the German frequently borrows adjectives (for example) from foreign sources to correspond to nouns of native formation, the Dutch has for the most part such adjectives paronymous with the nouns. Thus the Germans may use the word Wissenschaftslehre for philosophy, but are obliged to adopt philosophisch for philosophical; while the Dutch have Wijsbegeerte and wijsgeerig, both of native origin.

The oldest literary monument of the language of the Netherlands is, as far as can be ascertained, an ordinance of the town of Brussels dated 1229, although it is possible that a few of the poems which have come down to us, particularly 'Reinaert de Vos' (Renard the Fox) may belong to the second half of the 12th century. In the latter part of the 13th century the language was brought to a pretty high point of literary cultivation by Jacob van Maerlant (born 1235), author of the 'Spiegel Historiæ,' but not long after his date the language began to decay, owing to the introduction of French forms, words, and idioms through the Burgundian domination (1363-1477). A few literary societies called Rederijkerskamern, appear to have striven against this result, but their efforts were not rewarded with any success until the struggle witn Spain at the close of the 16th century produced a reaction among the population of the Netherlands in favor of their native language, a reaction which, however, proved permanent only in the northern Protestant provinces, which eventually succeeded in throwing off the Spanish yoke, and which now form the kingdom of the Netherlands. The chief specimens of the language belonging to the period intervening between Maerlant and the reaction at the close of the 16th century are the civic laws of Antwerp (1300), a few chronicles such as that of J. Van Clere, and a translation of Boethius by Jacob Velt of Bruges (15th century).

The leaders in the restoration of the language of the Netherlands, or as we may now call it Dutch, to the dignity of a literary medium were Dirk Volkertszoon Coornhert and Filips van Marnix, both distinguished also as statesmen who took a leading part in all the political and theological conflicts of the day. Coornhert (1522-90) was a poet and dramatist as well as a prose-writer; but while in his poems and dramas he rises little above the Rederijker of his time — of a society of whom at Amsterdam he was a member — his numerous prose works are still looked upon as works of merit. Marnix (1538-98), although inferior to the former in purity of language, obtained even greater renown by his 'Bijenkorf der heil Roomsche Kerche' (1569, often since reprinted and translated into foreign languages). One of these two (it is uncertain which) is also the author of the national song 'Wilhelmus van Nassauwen.' The efforts of these men were entirely successful so that before the final conclusion of peace (1648) the golden age of the Dutch national literature, which fills up the greater part of the 17th century, had begun. Energy, independence, vivacity, and elevation of sentiment characterize the more important writers at the beginning of this period, among whom Hooft and Vondel hold the first place. Pieter Corneliszoon Hooft (1581-1647) brought the prose style to a high degree of excellence, and Joost van den Vondel (1587-1679), the greatest of Dutch dramatists, performed the same service for the language of poetry, and made it peculiarly fit for the expression of the sublime. Jacob Cats, familiarly known in Holland as 'Father Cats' (1577-1660), on the other hand, confined himself to the sphere of every-day life. His verses are marked by a careless ease, sometimes even slovenliness; but his language is pure, a circumstance of some importance, since after the termination of the war, when the mind of the people had become toned down from the high pitch to which it had been raised by their struggle for freedom and independence, he became the special favorite of his countrymen, and had thus a large share of influence in determining the character of the national language. Among the other leading names in pure literature belonging to this period are those of Constantyn Huygens (1596-1686), father of the celebrated mathematician, a satirist, epigrammatist, and didactic poet; Jacob van Westerbaan (died 1670) and Jan Van Hemskerk (died 1656), both erotic poets, the latter author of 'Minnedichten,' in imitation of Ovid, and also of a poetic romance entitled 'Bataavsche Arcadia'; Dirk Kamphuisen (died 1626), a celebrated hymn-writer. No department of literature received more attention than the drama during this period, and several authors who afterward distinguished themselves in other fields began their literary career as dramatists. Among these were Brandt (died 1685), who was also an historian and epigrammatist; Ondaan (died 1692), a political writer and lyrist; and Antonides van der Goes (died 1684) celebrated as a lyrist chiefly on account of his poem 'De Ijstroom' in which he sings the praises of Amsterdam. The principal writer of comedies was Bredero (1585-1618), whose language is that of the lowest of the people.

With the sinking of the national spirit which followed the conclusion of peace the national literature also began to decline, and its decline was hastened by its falling under French influence, to a great extent in consequence of the large influx of French Huguenots after the revocation of the Edict of Nantes (1685). In the crowd of feeble imitators of French originals which the 18th century produced in Holland, there are but few that can be singled out either as having kept themselves more or less free from that baneful influence, or as having shown unusual ability in what they performed under it. Among the former are the nature-poet Hubert Corneliszoon Poot (died 1733), the lyrist Jan van Broekhuisen (died 1707), and Pieter Langendijk (died 1756), a writer of comedies; among the latter Lucas Rotgans (died 1710), author of a number of dramas and a tedious epic entitled 'Willem III.,' Arnold Hoogvliet, Sijbrand Feitama, Nicolas Simonszoon van Winter (died 1795), and the brothers Van Haren.

During all this period, however, the language had maintained its purity almost uncorrupted, and again swept itself quite free from foreign taint when the literature took a more healthful development in the last quarter of the 18th century. The immediate cause of this change was the occupation of the Dutch with German literature, at that time energetically rising into prominence; and the change was assisted subsequently by their becoming acquainted with English literature, and by the internal commotions and the dangers from without, which quickened the national spirit. The change was first discernible in the lyric poetry. Jacob Bellamy (1757–86) and Rijnvis Feith (1753–1824) show most plainly in this branch of poetry the influence of the Germans, while Pieter Nieuwland (1764–94) formed himself more after the ancients. Willem Bilderijk (1756–1831), admirably gifted by nature, acquired by study and practice a wide knowledge of literature and a rare command of language, and shone in all departments of poetry, but was unable to breathe into his works any originality, owing to his rigorous adherence to the pedantic rules of Boileau, which prevented his rightly appreciating English and German literature. J. F. Helmers (1767–1813), a poet of more warmth than Bilderdijk, won great applause by the descriptive poem 'De Hollandsche Natie,' in which he glorifies his native country. The pleasing Hendrik Tollens (1780–1856) was as a lyrist the avowed favorite of his country, and his 'Overwintering der Hollanders op Nova-Zembla' is regarded as the best descriptive poem in the Dutch language. Among the others whose productions have met with more or less acceptance are Cornelis Loots, Adriaan Loosjes, Ad. Simons, the original and humorous A. C. W. Staring van den Wildenborch, Bilderdijk's disciple and eulogist· Isaak Dacosta, by birth a Portuguese Jew, and J. J. L. ten Cate, an able translator of foreign poetry. An important service was rendered to the literature of his country by Jacob van Lennep (1802–68), who, incited by the example of Scott and Byron, introduced romanticism, and successfully repressed French classicism, by his masterly treatment of native tales and historical subjects in narrative poems. His chief followers are A. Bogaers, H. A. Meyer, B. ter Haar, and N. Beets. The dramatic productions of this period are comparatively insignificant. Prose, which since Brandt had sunk very low in Holland, was first raised again by Justus van Effen in his 'Hollandschen Spectator' (1731–5), an interesting periodical in imitation of the English 'Spectator.' About the beginning of the 19th century Van der Palm, De Borch, Siegenbeek, and others, acquired more or less distinction as historians; but the prose of Holland continued to be characterized by a somewhat strained rhetorical style till it was freed from its fetters by Geel and Van Lennep, the latter of whom wrote novels in language at once refined and popular. The novelists who rank next to Van Lennep are Oltmans (pseudonym Van den Hage), Mrs. Bosboom-Toussaint, Mulder, Hofdyk, Adele Opzoomer (pseudonym A. S. C. Wallis), Dekker, Daum (pseudonym Maurits), Van Rees, etc. Maarten Maartens writes his novels both in English and Dutch. Besides these novelists by profession the dramatist Schimmel has done good work in the department of the historical novel, and the poet N. Beets has published, under the title of 'Camera Obscura,' a series of sketches and tales illustrative of Dutch life overflowing with wit and humor. The list of recent Dutch prose writers also includes Weitzel, Lange, J. ten Brink, Gorter, Huet, Fruin (the Dutch Motley), Vosmaer, Vissering, Pierson, Keller, the youthful poet Perk (1860–81), Emants, Kloos, Netoscher, Verwey, Pol de Mont, Couperus, Schaepmann, Borel, Van Hulzen, Van Eeden, Helene Swarth-Lapidoth, Van Deyssel, De Koo, and Steijn Streuvels.

Dutch Science and Scholarship.— The Dutch on the whole can point to higher names in the various branches of scholarship and science than in that of pure literature, a circumstance which is no doubt partly due to the greater ease with which the results of such labors can become known and appreciated in translations than those of pure literature. Gansfort and Agricola in Groningen were among the first who distinguished themselves as divines and scholars. Erasmus of Rotterdam made far greater progress. A still greater genius, Hugo Grotius, in the beginning of the 17th century devoted himself simultaneously to philology and antiquities, poetry, history, philosophy, theology, and jurisprudence in all its branches. The northern provinces were long destitute of a university; that of Louvain, in Brabant, served for all the Low Countries. But the University of Leyden, founded in 1575 by Prince William I., soon exerted a beneficial influence over the whole united Netherlands. Men like Scaliger, Lipsius, Daniel and Nicolas Heinsius, Gronovius, Spanheim, Arminius, Drusius, Coccejus, and others, made this university famous over all Europe. Universities were also founded at Franeker in 1585, at Groningen in 1614, Utrecht in 1636, and Harderwijk in 1647, and their competition with the University of Leyden was very advantageous to science. Toward the end of the 17th century Huygens, Leeuwenhoek, Zwammerdam, and Hartsoeker distinguished themselves, in natural history and astronomy; Alb. Schultens, Tiberius Hemsterhuis, Lambert ten Kate, and Hermann Boerhaave in medicine; and a series of distinguished men flourished, particularly at Leyden. Utrecht had its Wesseling, Duker, Drakenborch, and Saxe. Among the jurisconsults Mathaeus, Huber, Noot, and Voet are distinguished. The cultivation of the Dutch language was especially promoted by Lambert ten Kate, Sewels, Zeydelaar, Kramer, and Van Moerbeek. In philology, history, geography, mathematics, natural philosophy, and medicine, the Dutch distinguished themselves in the highest degree, and their contributions to civil and public law are very valuable. They have always had men of the first distinction in ancient classical literature. From these notes it will appear that efforts have been made to adopt the language to elevated purposes, and that they have been crowned with success. The prose of the Dutch has little euphony and elegance, but it is well adapted to express practical truths in a simple and popular manner. It would undoubtedly have acquired greater perfection if their philosophical and other writers had not often made use of a foreign language. Erasmus, Lipsius, Grotius, Wyttenbach, and others, wrote in Latin, and Francis Hemsterhuys in French. As with philosophy, so also with history. The sciences have flourished in the northern provinces, and kept pace with the progress of the times; but this is not the case in the southern provinces. The study of the law and of general jurisprudence is in a flourishing condition, and medicine has its notable exponents. The Dutch excel in mechanics and hydraulics. The orthography of the Dutch language was at one time very unsettled; but a uniform system has been adopted in the schools since 1804, though opposed vigorously by Bilderdijk and others. Consult: Schneider, 'Geschichte der Niederländischen Litteratur' (1887); and Ten Brink, 'Geschiedenis der Nederlandsche Letterkunde' (1896).

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Netherlands Schools of Painting, The, are comprised in the Dutch and the Flemish schools.

The Flemish school was founded by the brothers Hubert and Jan van Eyck, who established themselves at Bruges, and attracted scholars from far and near. They are believed to have flourished between 1370 and 1445. The Flemish school is distinguished by brilliant coloring; magical effect of the chiaroscuro; carefully labored, though often tasteless drawing; a strong yet natural expression, and boldness in composition. Among the scholars of the Van Eycks is Hans Memling, an artist whose works are among the best of the early Flemish school. Among later masters of the same school are Quintin Matsys or Messys of Antwerp (died 1529), Luke of Leyden (died 1533), and wholly in the 16th century Francis Floris (born 1520; died 1570), called, on account of the great influence he exercised on contemporary painting, the Flemish Raphael. Among his scholars were the two Francks, the two Pourbuses, and Mart. de Vos (born 1520). Other painters rather later in time are Spranger (born 1546); Henry Steenwyk, the painter of perspective (born 1550); Denis Calvert; the brothers Paul and Matthew Bril; Van Ort (born 1557); and the two Pieter Breughels, father and son; Roland Savery of Courtray (born in 1576). After all these came Peter Paul Rubens (1577–1646), the boldest painter of modern times; a man of inexhaustible industry, of gigantic imagination and power of representation, to whom about 4,000 paintings are ascribed. With him the Flemish school reached its acme. Several distinguished painters follow: Frans Snyders (born 1579), whose hunting and animal pieces excel all others in boldness and truth; Josse de Momper (born 1580), a landscape-painter esteemed for his valleys and the distant views which they present; Pieter Neefs, the famous church painter; David Teniers, father and son, noted for their representations of peasants, guard-rooms, tap-houses, and all kinds of low life; Gaspar de Crayer (born 1582), who approaches in the expression and coloring of his historical paintings to Rubens; Gerard Seghers, distinguished as a historical painter; his brother Daniel, famous for flower and insect pieces. Jakob Jordaens (born 1594), however, excelled all those who make Rubens their model. Abraham Janssen and his pupil Theodoor Rombouts equal Rubens in coloring, but not in conception. The industrious Luke van Uden executed the landscapes for Rubens' paintings, and his views of the sky at dawn are worthy the study of every artist. Anthony Vandyck (born 1599) obtained the name of the "king of portrait painters." He excelled Rubens in correctness and beauty of forms. Cornelius Schut, for whom Jan Wildens often painted the landscapes, distinguished himself as a historical painter; Adriaan Brouwer acquired fame by his excellent representations of scenes from common life; Jan van der Meer by his pastoral pieces; Anton Francis van der Meulen by his battle pieces; Frans and Jan Milet, father and son, by their landscapes. Besides these there are the names of Jan Bol, Wenceslaus Koeberger, Hendrik Goltzius, Hendrik van Balen, Frans Hals, Willem van den Nieuwelandt, Abraham Diepenbeck, Theod. van Thulden, Gerard Lairesse, Jan Frans van Bloemann, Jan van Cleef, Pieter Eykens, Robert van Oudenarde, Jan Anton van der Leepe, Jan van Breda, etc.

The Dutch school is distinguished for a faithful copying of nature, great finish, good chiaroscuro, skilful disposition of colors, and delicate penciling; but it is reproached with choosing often ignoble subjects and with incorrectness of drawing. Its founder is Luke of Leyden (born 1494). Its most prominent artists are Otho van Veen, of Leyden (born 1586; died 1634), who deserves mention also as the teacher of Rubens. Abraham Bloemart of Gorkum (died 1647) painted historical subjects, landscapes, and animals in good taste. Cornelis Poellenburg of Utrecht (born 1586; died 1663) was peculiarly happy in painting small landscapes with figures. Worthy pupils of his are Daniel Vertange and Jan van Haensberge. Johan Wynants of Haarlem (born 1600) is distinguished as a landscape-painter; and Jan Daniel de Heem, of Utrecht (born 1604; died 1674) for his faithful imitation of flowers, fruits, carpets, vases, etc. The highest place belongs to Rembrandt (1606–69), whose masterly coloring atones for all his defects. In the delineation of common life the following are distinguished: Gerard Terburg of Zwoll (born 1608; died 1681); Pieter van Laar (1613–73), the two Ostades, and Jan Steen (1636–89); in landscapes, Jan Both of Utrecht (born 1610; died 1650); Hermann Swaneveld of Woerden (born 1620; died 1690). Asselyn (born 1610; died 1680) painted battles, landscapes, and pastoral pieces with a brilliant coloring and a delicate pencil. Scarcely any painter drew more correctly, colored more beautifully, and distributed light more truly than Gerhard Dow or Douw (born 1613; died 1680). John Fyt (born at Antwerp, 1625) was a good painter of beasts, birds, and fruits; Gabriel Metzu, who worked in the style of Terburg, excelled him in softness of penciling. The landscapes of Benenberg of Utrecht are full of life and freshness. Philip Wouvermans (born 1620; died 1668), the most famous painter of horses, produced battle and hunting pieces, horse-markets, travelers, and robbers; and his paintings of all kinds are highly esteemed. The landscapes of Anton Waterloo, for which Weenix executed the figures, are sometimes cold, but please on account of the accuracy with which he represents light playing through foliage and the reflection of objects in water. Berghem acquired the name of the Theocritus of painters; and perhaps Paul Potter is the only one who can dispute the superiority in representing cattle with him. While Ludolf Backhuysen painted storms at sea with an effect as true as it is terrible, Frans Mieris distinguished himself by fine and accurate representations of many domestic subjects, and Jan Pieter Slingeland was hardly less accurate. Godfrey Schalken of Dort excelled in the illumination of night scenes. Excellent market scenes, animals, and landscapes were painted by Karel du Jardin. Albert Cuyp and Adriaan van de Velde painted landscapes and animals with almost unequaled perfection. Hobbema is another excellent landscape-painter. For the representations of the beautiful solitudes of nature Jakob Ruysdael is celebrated, and for quiet lovely moonlight scenes Van der Neer. No painter has painted more delicately and with more finish, even in insignificant trifles, than Adriaan van der Werf. The flower-painters, Pieter van Hulst of Dort, and Jakob van Huysum, are almost unrivaled in this department. Other names are Cornelis Ketel, Bartholomew van der Helst, Albert van Everdingen, Gerbrandt van den Hendrik Verschuuring, Maria van Oosterwyk, Willem Kalf, Melchior Hondekoeter, Cornelis de Bruyn, the two Houbraken, Rachel Ruisch, Cornelis du Sart, Jan de Witt, Cornelis Troost, Van Os, Van Spaendonck, Scheffer, Ommeganck, etc. About the beginning of the 19th century the classicism of France had a great influence on the Dutch historical school, as seen in the works of Kruseman, Pieneman, Navez, and Van Bree. In genre painting the old models were still followed, and good work was done by Jan Kobell and Eugene Verboeckhoven; Scheefhout and Schotel deserve mention as landscape and marine painters. A more natural and correct style followed the fall of the school of David in France, and Louis Gallait, Edouard de Biefve, Gustaf Wappers, Nicaise de Keyzer, and Hendrik Leys distinguished themselves as historical painters. Florent Willems and Alfred Stevens were genre painters. A. de Kuyff and Xavier de Cock painted excellent landscapes. Among Dutch painters of the present day we should specially mention Alma Tadema and Josef Israels. The former long resident in England, a baronet and member of the Royal Academy, is remarkable for the skill with which he treats subjects selected from states of civilization that have passed away, as from ancient Egypt, Rome, or the Franklin monarchy. The genre pictures of Israels and of Bisschop are also well known. The artists of the Netherlands are still distinguished by the peculiarities of the two schools, the Dutch and the Flemish. The reproach of an almost exclusive adherence to common reality has been often made to the whole school of the Netherlands, but is confined by some to the Dutch; while the Flemish school, they say, in its more elevated productions has striven to represent a nobler nature. The chief question in painting, however, is not what the artist attempts, but what he accomplishes; and if critics are right in saying that in the works of the Flemish painters we generally miss the spirit of the poet in the beauty of the manual execution, then the Dutch school would deserve the preference, because, though it takes most of its subjects from common reality, it often represents them with a poetic conception of their character. It would be better, however, to describe them both as deficient in ideal beauty, but as distinguished in the highest degree for faithful imitation of nature.

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Nethersole, nĕth'ėr-sōl, **Olga,** Anglo-American actress: b. Kensington, England, 18 Jan. 1870. She made her début in ‘Harvest’ at the Theatre Royal, Brighton, in 1887 and the year following was engaged at the Royal Adelphi theatre in London. She was later engaged at the Garrick in London and then made a tour of Australia. Her next appearance in London was at the head of her own company playing ‘The Transgressor.’ She has made several trips to the United States where she has been well received. Her leading roles are: Camille; Juliet; Carmen; etc. See Strang, ‘Famous Actresses of the Day in America’ (1899).

Neth'inim, in Biblical history, the lowest order of ministers of the temple at Jerusalem. They were hereditary attendants on the Levites in the services of the Temple and were to do the more menial part of the work. It is supposed that the Gibeonites originally held a similar office (Josh. ix. 21–27.) At the return from Babylon, 392 of these ministers accompanied Zerubbabel (Ezra ii. 58, Neh. vii. 60), and 220 came with Ezra (Ezra viii. 17, 20); 612 of them in all.

Néthou, nā-too', **Pic de,** Spain, the highest point (11,169 feet) of the Pyrenees (q.v.).

Net'ley, Abbey, and **Netley Hospital,** England. See Southampton.

Netscher, nĕts'ʜĕr, **Caspar,** Dutch painter: b. Heidelberg 1639; d. The Hague 15 Jan. 1684. He was taken to Holland in early childhood and as the adopted son of a physician early began the study of medicine, but eventually learned painting from Koster, a still-life painter of Utrecht, and from Terborch (q.v.) at Deventer; he also spent a short time during his student years at Bordeaux, France, but eventually settled permanently at The Hague. He was a genre painter who imitated the manner of Terborch, and chose his subjects from aristocratic life. He sometimes, however, painted kitchen interiors, and sheep, also portraits. His weakest work consists of small, delicately handled and enamel-like pictures of historical and mythological subjects, which are blemished by mannerisms. Almost every public gallery in Europe contains examples of his numerous works, but the Dresden gallery is particularly rich in his cabinet pieces, such as, his ‘Lady at the Harpsichord’; ‘The Doctor's Visit’; ‘The Harp Player.’

Nettement, nĕt-măṅ, **Alfred François,** French journalist: b. Paris, France, 22 July 1805; d. there 15 Nov. 1869. He was educated at the Collège Rollin in Paris and entered journalism. He founded ‘L'Opinion Publique’ and for his staunch support of the grandson of Charles X. he was imprisoned by Louis Philippe after his accession. He wrote: ‘History of the Revolution of July, 1830’ (1833); ‘History of French Literature under the Reign of

Louis Philippe' (1854); 'Histoire de la Restauration' (8 vols. 1860-72); etc.

Net'ter, Thomas, also called **Waldensis,** English Roman Catholic clergyman: b. Saffron Walden, England, about 1377; d. Rouen, France, 2 Nov. 1430. He entered the Carmelite order and graduated from Oxford, receiving ordination in 1394. He became provincial prior of the Carmelites in 1414 and strongly opposed the Lollard reform movement. He was confessor to Henry V. and Henry VI. and died while on a mission to Poland for the latter. He wrote: 'Doctrinale Fidei Ecclesiæ Catholicæ contra Wiclevistas et Hussitas' and the 'Fasciculi Zizanorium Magistri Johannis Wyclif.'

Nettle, a plant of the natural order *Urticaceæ,* having unisexual flowers, the male and female on the same or separate plants: the male flowers with a 4-parted perianth and four stamens; the female flowers with a 2-parted perianth and a tufted stigma, fertilized by the wind; the fruit an achenium. The species are herbaceous plants, shrubs, or even trees, many of them covered with stinging hairs, which pierce the skin when touched, and emit an acrid juice, often causing much inflammation and pain. These hairs are stiff and terminate in a silicious point which penetrates an animal's skin, breaks off and sets free a poison, the nature of which is not understood. When a nettle is grasped in such a way as to press the hairs to the stem no stinging ensues; but the slightest inadvertent touch of some of the species produces very severe pain. The stinging of the native nettles of Europe is trifling in comparison with that of some East Indian species. *Urtica crenulata* is particularly notable for the severity of the pain which it produces, without either pustules or apparent inflammation. The first sensation is merely a slight tingling, but within an hour violent pain is felt, as if a red-hot iron were continually applied, and the pain extends far from the original spot, continues for about 24 hours and then abates, but is ready to return in its original intensity on the application of cold water, and does not cease for fully eight days. Cold water has a similar effect in increasing or renewing the pain of all kinds of nettles. Still more formidable than this species is *U. urentissima,* the devil's leaf of Timor. The two most familiar species throughout America and Europe in waste places are the small virulent *U. urens,* and the least venomous is the most common and only perennial species, the great nettle (*U. dioica*), everywhere abundant, but particularly near human habitations, or their former sites, the desolation of which it may be said to proclaim. The roots of nettles, boiled with alum, afford a yellow dye; and the juice of the stalks and leaves has been used to dye woolen stuffs of a beautiful and permanent green. The young shoots of *U. dioica* have been much used in some parts of Scotland and other countries as greens, and their peculiar flavor is much relished by some, although, in general, the use of them is confined to the poor. They are valuable as antiscorbutics, but are gritty to the taste from the quantity of crystals (cystolithes) contained. Whatever it is that gives nettles their stinging power is dissipated by boiling and drying. The high value of nettles as food for swine is well known to the peasantry of many countries; the great nettle is cultivated in Sweden for fodder of domestic animals; and nettles are also highly esteemed as food for turkeys. The seeds are extremely nutritious to poultry, and are given to horses by jockeys, in order to make them lively when they are to be offered for sale. The stalks and leaves are employed in some parts of England for the manufacture of a light kind of beer, called nettle beer. The bast-fibre of nettles is useful for textile purposes. Yarn and cloth, both of the coarsest and finest descriptions, can be made of it. The fibre of *U. dioica* was used by the ancient Egyptians, and is still used in various countries. When wanted for fibre the plant is cut in the middle of summer, and treated like hemp. Nettle-cloth, or grass-cloth, is a beautiful fabric made from rhea fibre. The fibre of *U. cannabina,* a native of the south of Siberia, Central Asia, is much used; and from that of *U. whitlavi* both fine lace and strong ropes can be manufactured. The fibre of *U. japonica* is much used in Japan, that of *U. argentea* in the South Sea Islands; that of *U. canadensis* in Canada; and that of *U. heterophylla,* a widely-diffused Indian species, is of very glossy silky appearance, and is manufactured into cloth in Assam. (See FIBRE.) The seeds and herbage of *U. membranacea* are used in Egypt as emmenagogue and aphrodisiac; and somewhat similar properties are ascribed to *U. dioica.* *U. tuberosa* produces tubers, which are nutritious, and are eaten in India raw, boiled, or roasted. Australia produces a magnificent tree-nettle, *U. gigas,* abundant in some parts of New South Wales, ordinarily from 25 to 50 feet high, but sometimes 120 or 140 feet, with trunk of great thickness, and very large green leaves, which when young sting violently.

Many plants are so-called, as the "dead nettles," labiates of the genus *Lamium;* the "horse nettle" (*Solanum carolinense*); and others.

Nettle-butterfly, a European butterfly (*Vanessa urticæ*), which feeds and lays its eggs on nettles; other butterflies, including American species, have the same habit.

Nettle Rash. See URTICARIA.

Nettle-tree, a tree of the genus *Celtis,* especially in the United States the hackberry (q.v.); and in Europe *C. australis,* commonly planted as a shade-tree in France and Italy.

Nettleship, net'l-shĭp, **John Trivett,** English painter and writer: b. Kettering, England, 11 Feb. 1841; d. London 31 Aug. 1902. He studied art under Poynter in the Slade School, London, and made a specialty of wild animals. His many striking and imaginative canvases include: 'Puma Devouring a Peacock'; 'A Death Grip'; 'A Mighty Hunter'; 'A Big Drink'; 'The Blood Trail.' Among his writings are: 'Essays and Thoughts,' a contribution to Browning Literature (1890), and 'George Moreland' (1898).

Nettleton, nĕt'l-tȯn, **Alvred Bayard,** American soldier and journalist: b. Berlin, Ohio, 14 Nov. 1838. He was educated at Oberlin College and entered the Union Army at the outbreak of the Civil War, rising from the ranks to be brevet brigadier-general. He studied law after the war and engaged in a journalistic career, and in 1890-3 he was assistant United States treasurer. He wrote: 'Trusts or Competition' (1900).

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